ERIC REPORT RESUME

ED 010 175   1-30-67   56   (REV)

THE UTILIZATION OF LARGE-SCREEN TV TO OVERCOME SHORTAGES OF
CLASSROOM SPACE AND TEACHING PERSONNEL.
RICH, OWEN S. * AND OTHERS
BSK05776 BRIGHAM YOUNG UNIV., PROVO, UTAH

NDEA-VIIA-1327
BR-5-0843
  -   -66   OEG-7-54-0010-265
EDRS PRICE MF-$0.18 HC-$3.48   87P.

*INSTRUCTIONAL TELEVISION, TELEVISION, *AUDITORIUM,
EDUCATIONAL FACILITIES, INSTRUCTOR CENTERED TELEVISION,
*COLLEGE INSTRUCTION, CLOSED CIRCUIT TELEVISION,
*CURRICULUM DEVELOPMENT, EDUCATIONAL RESEARCH, PROVO, UTAH

THE OBJECTIVES OF THIS STUDY WERE (1) TO DEVELOP GUIDELINES FOR ADOPTING CURRENT COLLEGE COURSES FOR THE PRESENTATION BY LARGE-SCREEN TELEVISION IN LARGE AUDITORIUMS, (2) TO IDENTIFY AND DEVELOP TECHNIQUES FOR LARGE-SCREEN TV INSTRUCTION, (3) TO DEVELOP STUDENT AND FACULTY ORIENTATION PROCEDURES FOR LARGE-SCREEN TV PROGRAMS, (4) TO ASCERTAIN OPTIMUM DISTANCE AND VIEWING ANGLES, AND (5) TO ANALYZE ECONOMIC IMPLICATIONS AND INSTRUCTIONAL VALUE OF LARGE-SCREEN TELEVISION AS PART OF CURRICULUM PLANNING. EACH OF THESE OBJECTIVES IS TREATED SEPARATELY IN THIS REPORT. THE TREATMENT IS PRIMARILY DESCRIPTIVE AND SUGGESTIVE--EXPERIMENTAL ACTIVITIES ARE REPORTED AND INTERPRETED WITH THE USE OF TRADITIONAL CONTROLLED RESEARCH TECHNIQUES ONLY IN CONNECTION WITH PARTS OF THE INVESTIGATION. THE STUDY SUPPORTS THE VAST ARRAY OF TV STUDIES SHOWING NO SIGNIFICANT DIFFERENCES IN MEASURED LEARNING OR INFORMATION GAIN BETWEEN FACE-TO-FACE INSTRUCTION AND TELEVISION. THE STUDY ALSO SUPPORTS A PREVIOUS STUDY SHOWING NO SIGNIFICANT DIFFERENCES IN LEARNING BETWEEN CONVENTIONAL TV AND LARGE-SCREEN TV. MANY USEFUL GUIDELINES ARE PRESENTED RELATIVE TO LARGE-SCREEN TV PRESENTATIONS. (JC)

ED010175

5-0843

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

THE UTILIZATION OF LARGE-SCREEN TV TO OVERCOME SHORTAGES OF CLASSROOM SPACE AND TEACHING PERSONNEL

by
Owen S. Rich
Richard D. Poll
Tess M. Williams

Title VII Project Number 1327
National Defense Education Act of 1958
Grant Number OE-7-54-0010-265

Brigham Young University
Provo, Utah

The Research Reported Herein Was
Supported by a Grant from the
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Office of Education

FINAL REPORT OF A STUDY OF THE UTILIZATION OF LARGE-SCREEN TV TO OVERCOME SHORTAGES OF CLASSROOM SPACE AND TEACHING PERSONNEL

PRINCIPAL INVESTIGATOR

Owen S. Rich, D. Ed.
Professor of Communications
Brigham Young University

ASSOCIATE INVESTIGATORS

Richard D. Poll, Ph. D.
Professor of History
Brigham Young University

Tess M. Williams, M.A.
Asst. Prof. of Communications
Brigham Young University

RESEARCH ASSISTANTS

Lowell A. Connor
Bernell Edwards
Marvin Bell

This Study Was Made Possible by a Grant
From the United States Department of Health, Education, and Welfare
(Under Title VII of the National Defense Education Act)

1965-1966

TABLE OF CONTENTS

CHAPTER Page

I. INTRODUCTION. 1
  Nature of the Study. 1
  Occasion for the Study. 2
  Objectives of the Study. 3
  Related Research. 3

II. THE LARGE-SCREEN TV FACILITY AT BRIGHAM YOUNG UNIVERSITY. 5
  Large-Screen System Planning. 5
  The Auditorium. 5
  Auditorium Modification. 6
  The Television Projection System. 8
  The Auditorium Projection Booth. 11
  The Large-Screen Distribution System. 11
  The ITV Studio. 11
  Special Instructional Equipment. 11

III. THE INSTRUCTIONAL EFFECTIVENESS OF LARGE-SCREEN ITV. 14
  The Research Hypothesis. 14
  The Experimental Design. 14
  The Experimental Classes. 14
  The Student Sample. 15
  Statistical Treatment of the Test Data. 16
  Significance of the Findings. 17

IV. VIEWING ANGLE, DISTANCE, AND LARGE-SCREEN ITV LEARNING. 18
  The Problem. 18
  Related Research. 18
  The Research Design. 18
  Statistical Results and Conclusions. 19

V. STUDENT ATTITUDES TOWARD LARGE-SCREEN ITV. 21
  The Problem. 21
  The Research Design. 22
  Findings and Interpretations. 23
  Summary and Conclusions. 27

VI. FACULTY ATTITUDES TOWARD ITV. 29
  Introduction. 29
  Related Research. 29
  The Research Design. 30
  The Sample. 31
  Statistical Analysis. 31
  Summary and Conclusions. 33

VII. LARGE-SCREEN ITV PRODUCTION TECHNIQUES. 35
Introduction. 35
Available ITV Techniques. 35
ITV Techniques Unsuitable for Large-Screen Classes. 39
Special Large-Screen ITV Capabilities. 41

VIII. ECONOMIC IMPLICATIONS OF LARGE-SCREEN TV. 46
The Problem of Variabilities in Cost of Instruction. 46
Costs of History 170 at B.Y.U. 47
Impact of Intensive Use of Auditorium Space on Instructional Space Costs. 49
Estimating Costs of Large-Screen TV for other Courses. 50
Summary. 51

IX. SUMMARY AND CONCLUSIONS. 57
Large-Screen TV Facilities. 57
The Instructional Effectiveness of Large-Screen TV. 57
Student Location and Performance. 58
Student Attitudes Toward Large-Screen ITV. 58
Faculty Attitudes Toward ITV. 59
Large-Screen TV Production Techniques. 59
Teaching Load. 61
Teaching Assistants. 62
Criteria for Selecting Courses for Large-Screen ITV Presentation. 62
Economic Consideration of Large-Screen ITV. 64
General Conclusions. 64

APPENDICES

A. "T" Test Results of Effectiveness Studies 65

B. Student Attitude Questionnaire 73

C. Faculty Attitude Questionnaire 78

CHAPTER I

INTRODUCTION

Nature of the Study.

One of the paradoxes of contemporary higher education is that many campuses with bulging classrooms have thousands of square feet of auditorium space which is rarely used for instructional purposes. The teacher whom institutional necessity drives to perform as an amplified voice in such a setting is left with the feeling of a job only partially done--a feeling which some of the students doubtless share. So the space is shunned except for special events, while multiple sections of conventional courses tax classroom facilities and faculty time, and admissions offices struggle to stem the incoming tide.

The possible role of large-screen instructional television in meeting this challenge of crowded facilities and teacher shortages is the subject of this study. Because it has the capability of presenting a larger-than-life image of the instructor and also of enlarging visual displays and demonstrations, large-screen television--once the technical problems are resolved--raises the possibility of combining the visual impact of a motion picture with the immediacy of the traditional classroom lecture. It also raises the possibility of converting a thousand-seat auditorium into the equivalent of a new classroom building.

That overcrowding and understaffing are widespread in higher education is assumed in this study to require no documentation and that instructional television is an effective educational medium is assumed to have been demonstrated in previous research.

The use of TV in the classroom has been tested more extensively than any other teaching technique in the history of education. With almost boring regularity the results have shown no significant difference in learning between students taught in the conventional face-to-face situation and those taught by the use of classroom television. As a result of these studies, monitor-type TV has been incorporated into the instructional programs of many colleges and universities.

This inquiry focuses, therefore, on the special characteristics, capabilities and limitations of large-screen TV instruction, with the intent of developing guidelines for adapting conventional college classes to the medium. One controlled experiment, two opinion samplings, and the experiences and inferences of the participants in the study are incorporated in this report. Aspects of concern to both instructors and production personnel are considered, but the emphasis is academic rather than technical.

The first conclusion is that large-screen television offers significant educational possibilities for universities and colleges which, by choice or under the pressure of space, staff, or financial limitations, offer part of their instruction in large lecture-type classes. The second is that the adoption of a rather wide range of courses to the large-screen medium is academically , technically and economically feasible for most institutions which fall into this category.

Occasion for the Study.

At the time the study was conceived early in 1964, Brigham Young University, a private institution in Provo, Utah, with approximately 16,000 students, was operating with a classroom utilization of 95% on a 40-hour week with a student-teacher ration of 21 to 1. An increase of approximately 2,000 students was anticipated for the academic year 1964-1965. Since it was impossible to increase classroom capacity and difficult to enlarge the faculty sufficiently to handle this increase, a method of more effectively using current buildings and teaching personnel was considered an expedient alternative. It was thus proposed that Brigham Young University expand its instructional facilities to include large-screen television.

One of the major problems in taking this step was the lack of information concerning the most effective utilization of such a system. Prior to this time, the only carefully controlled experimentation with large-screen instructional TV had been conducted at Pennsylvania State University. However, this study was confined to the measurement of comparative effectiveness and student acceptance of the medium. To develop such information, it was proposed that in conjunction with the installation of the large-screen system there should be a systematic study of methods of improving the teaching and learning process for auditorium-size classes. In general, the study was to develop guidelines for the effective utilization of large-screen TV in such classes.

Objectives of the Study.

The specific areas proposed for study in the B.Y.U. project were

1. The development of guidelines for adapting current college courses for the presentation by large-screen television in large auditoriums.
2. The identification of current instructional TV techniques readily adaptable to large-screen TV instruction and the development of new presentation techniques designed for use specifically with large-screen TV.
3. The development of student and faculty orientation procedures for adjusting to a large-screen instructional TV program.
4. A study of optimum distance and viewing angle for large-screen instructional programs.
5. A detailed analysis of the economic implications and instructional value of large-screen television as part of institutional curriculum planning.

Each of these general objectives is treated separately in this report. The treatment is primarily descriptive and suggestive; experimental activities are reported and interpreted with the use of traditional controlled research techniques only in connection with parts of the investigation.

Related Research.

Most instructional television research has been studies of its effectiveness as compared with conventional face-to-face teaching. It is unnecessary here to review any of these individual studies in detail; the following reviews of accumulative findings are representative of the literature on the subject.

In 1956 Hideya Kumata reported on 47 in-school viewing efforts, 406 credit and non-credit courses offered by 77 colleges and universities, and 29 closed-circuit teaching programs. He found that, in general, there was a tendency for research to be an afterthought of the instructional TV effort. Nevertheless, Kumate said, "On the whole, television students have done as well and sometimes better." Kumata's conclusions appear to be drawn from 14 of the more carefully controlled studies.[1]

Presley D. Holmes, Jr., in 1959 made a study of 75 reports on instructional television and reported, "The over-whelming majority (almost 90%) of the gross comparisons between television and conventional communication conditions show no substantial difference in achievement or information gain."[2]

In 1962 Wilbur Schramm, using reports of the Ford Foundation, the Fund for Adult Educations, the U. S. Office of Education and various other sources, noted 393 cases in which classroom teaching has been compared with television instruction. He noted that in 65% of the comparisons there is no significant difference, in 21% students learned significantly more, and in 14% they learned significantly less from TV.[3]

The most extensive controlled studies of the comparative effectiveness of instructional television have been carried out at Pennsylvania State University. In describing them, L. P. Greenhill noted that in 29 out of the 32 comparisons, no significant difference in achievement was found.[4]

In 1962 Owen S. Rich, working under the direction of L. P. Greenhill and C. R. Carpenter at Pensylvania State University, conducted a study of the comparative effectiveness and acceptance of Eidophor-process large-screen television. The large-screen medium was found to be equally as effective as conventional instructional television in terms of measured academic achievement.[5]

---

[1] Kumata, Hideya. "Further Facts on a National Scale." In J. C. Adams, C. R. Carpenter, and D. R. Smith, College Teaching by Television, (Washington, D. C.: American Council on Education, 1958), p. 84.

[2] Holmes, Presley D., Jr., Television Researching in the Teaching-Learning Process. (Detroit: Wayne State University, 1959), p. 74.

[3] Schramm, Wilbur. "What We Know About Learning From Instructional Television," in Schramm et.al., Educational Television: The Next Ten Years. (Stanford: The Institute for Communications Research, 1962), p. 52.

[4] Greenhill, Leslie P. Closed-circuit Television for Teaching in Colleges and Universities. (University Park: Division of Academic Research and Services, Pennsylvania State University, 1962), (mimeographed), p. 5.

[5] Rich, Owen S. Comparative Effectiveness and Acceptance of Large-Screen TV. (The Graduate School, Pennsylvania State University, 1962), Unpublished dissertation.

CHAPTER II

THE LARGE-SCREEN ITV FACILITY

Large-Screen System Planning.

The development of a large-screen ITV program requires access to a large classroom or auditorium and the use of comparatively complex electronic equipment. The following detailed description of the planning and development conducted at Brigham Young University in connection with this study will be illustrative for institutions investigating this medium.

The Auditorium

The auditorium used in the large-screen instructional TV study was located in the Joseph Smith Building on the B.Y.U. campus. This auditorium was originally designed as a multi-purpose assembly and concert hall for university and student body functions.

Smith Building Auditorium

The hall seating area measures approximately 77 feet X 85 feet and has a seating capacity of 998 people. Prior to remodeling for television use, this capacity could be expanded by opening two full-length drapes at the rear of the hall and using the adjoining ballroom for additional seating.

The stage area of the auditorium is elevated 48 inches above the seating area; it measures 35 feet X 77 feet. The grillwork above the stage area originally served as a grid for lighting and cabling systems used in dramatic productions. Behind the grillwork on the rear wall of the stage area a large pipe organ is housed. Electrically controlled drapes separate the audience from the stage. A 20 feet X 20 feet (fully expanded) motion picture screen is installed on the rear wall of the stage area, facing the seating; it is electrically retractible from a stage floor control panel.

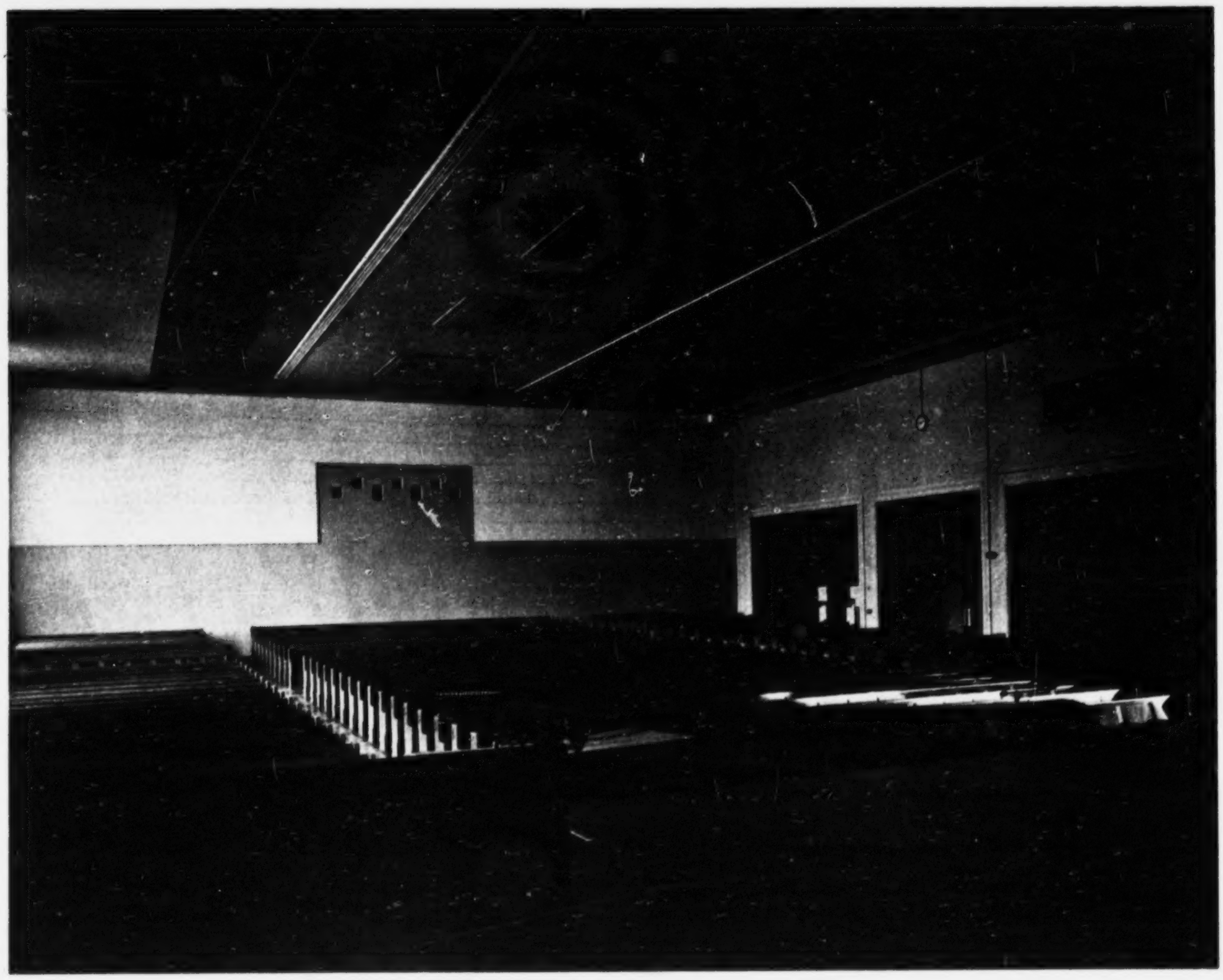
Two Altec-Landing A-7 Voice of the Theatre speaker systems are located in the proscenium arch above the stage, and the stage area itself is equipped with an audio amplification system suitable for connecting microphones with the proscenium speakers. The acoustical characteristics of the hall have been considered good to excellent for concerts and dramatic presentations. All wall surfaces prior to the remodeling of the hall were plaster.

A large portion of the north side wall of the auditorium contains three large windows and a door area. These openings, which can admit large quanitites of light during the daytime hours, are fully draped to exclude virtually all outdoor light if desired. The house lighting system consists of several large independently controlled light battens mounted at regular intervals from front to rear in the center of the ceiling; supplemented by a dual row of indirect lighting in troughs running from the front to the rear of the hall. This system is equipped with a selector and dimmer switch panel which provides flexibility in controlling the house lights.

Auditorium Modification

In order for the Joseph Smith Auditorium to be used effectively for large-screen ITV, it was necessary to make several modifications.

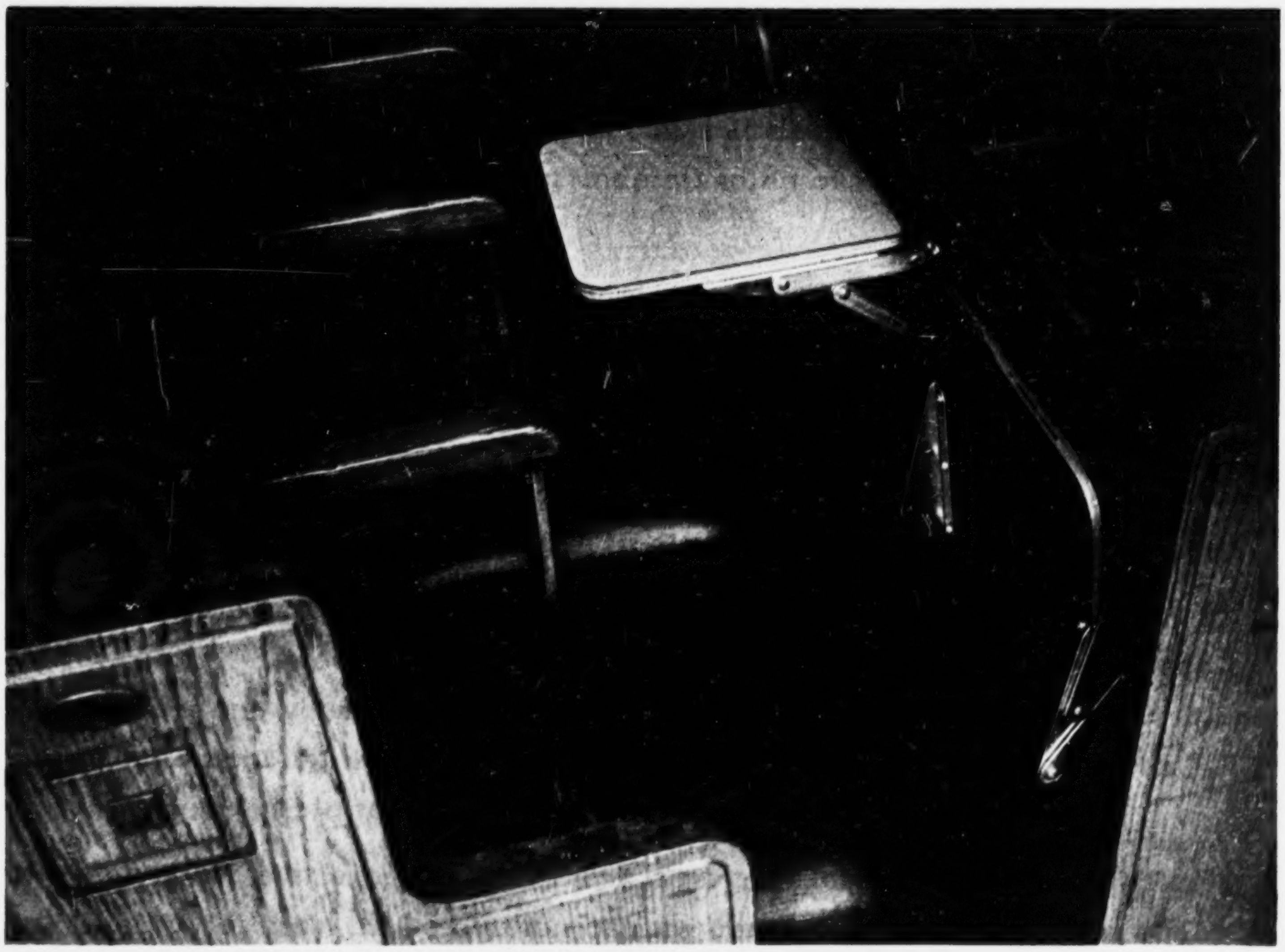
The full-length drapes at the rear were removed and a wall was constructed separating the auditorium from the ballroom area. The auditorium side of this wall was partially surfaced with non-resonant material to enhance the acoustical characteristics of the hall. A projection room was constructed on the second floor level behind the new rear wall of the auditorium to house the Eidophor TV projector and related electronic equipment.



Smith Building, Rear View

The house audio system was modified, making it possible to select audio signals going to the house speaker system from either the projection booth amplification system or the stage area microphone amplifiers. Dual controls for this transfer system were installed in the projection room to permit the TV operator to adjust the house lights for optimal TV projection and classroom note-taking. A control for raising and lowering the motion picture screen was also placed in the booth.

The auditorium seats are now fitted with individual retractible writing stands but lacked these facilities for convenient note-taking at the time this



Installations of Writing Surfaces On Auditorium Seats

research was conducted. The existing lighting characteristics of the auditorium were found to be suitable for TV class use, since light levels could be set at any desired intensity.

The Television Projection System.

Consideration was given to the use of multiple conventional TV monitors when the subject of auditorium classes was first raised, but the physical placement of the monitors, their protection and maintenance, the small screen size, and the multiple uses made of the Joseph Smith Auditorium were arguments against this alternative. The previous successful experience of Dr. Rich with large-screen instruction also contributed to the decision made.

The first successful large-screen TV system, the Schmidt process, was considered and rejected. This process projects an image from a high intensity television tube through a large-aperture optical system onto a standard motion picture screen. The decisive limitations were seen to be that the light source is a fluorescent surface with a resulting low light intensity, that the picture quality diminishes rapidly as the screen size is increased, and that the light level in the auditorium must be held at a level too low for note-taking.

The Eidophor system, adopted because it seemed most suitable, is described in a little detail to assist understanding of the technical aspects of this study.[1]

The Eidophor large-screen television projector is a control layer system invented in 1939 by Dr. Fritz Fischer, a scientist at the Swiss Federal Institute of Technology, Zurich. Following Fischer's death in 1947, the system was further perfected by Professor Ernest Baumann and manufactured by the firm of Dr. Edgar Gretener, Zurich, which had been formed with the backing of CIBA, a Swiss pharmaceutical company.

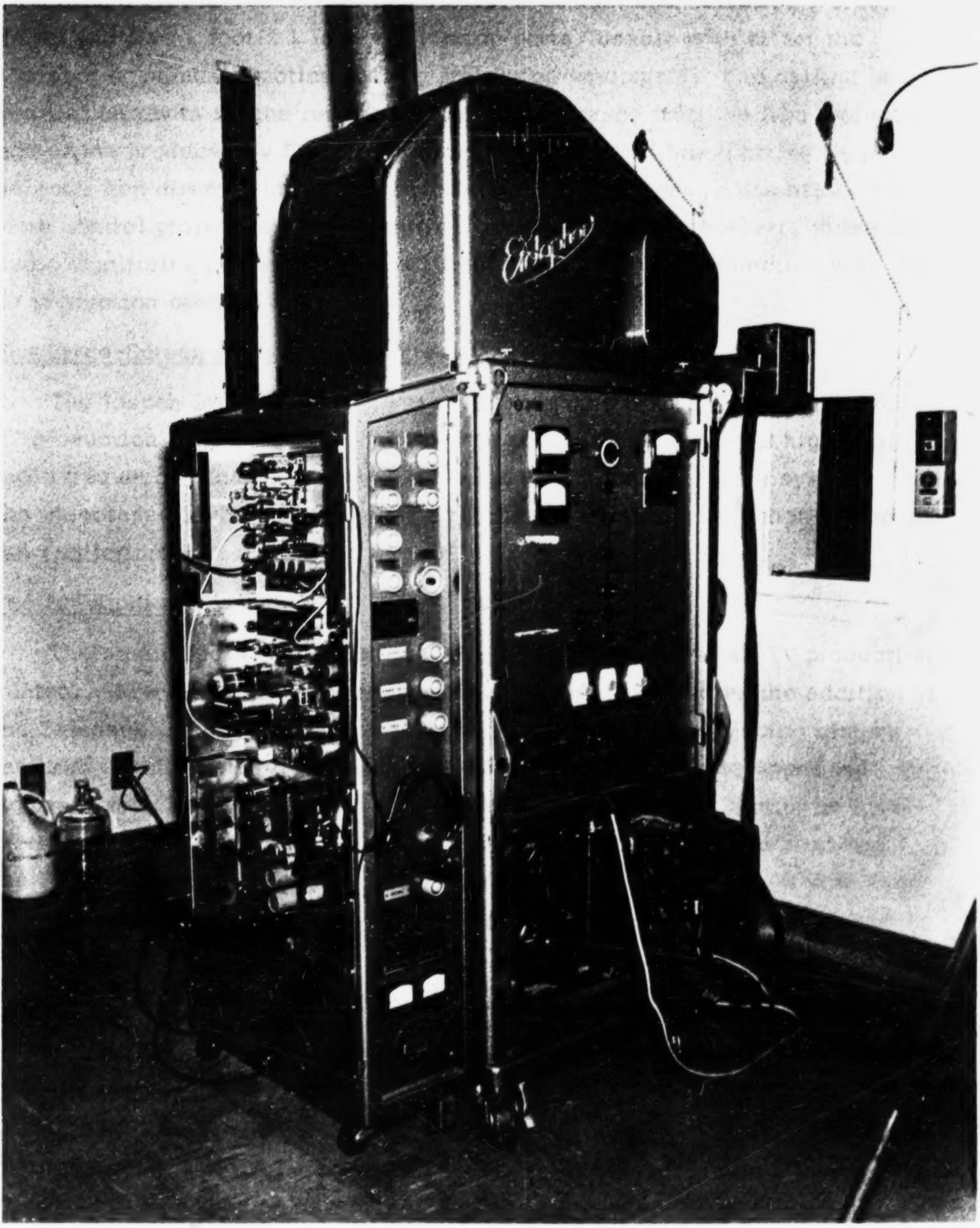
The Eidophor system projects a black and white television image up to 24 feet high X 32 feet wide. The image is large and bright and possesses a high definition; when adapted to color, it has extreme color accuracy. It is possible to achieve a 100 to 1 contrast ratio with the Eidophor projector, which is comparable to good film projection.

The basic elements of the control layer process are as follows: Electrical impulses from the television camera control an electron beam which bombards, and thus modifies, the surface of an oil film on a concave mirror. Light passes through the resulting "wrinkles" in the oil film and is projected through a special grating onto the screen. It is this modulated light beam that produces the image on the projection screen.

The Eidophor system uses a light source that is independent of the electron beam; thus the light output of the system is limited, largely, by the intensity of the light source. The projector used in this study was equipped with an 1800 watts Xenon light source. The distance from the projector to the screen was approximately 95 feet, producing an image approximately 13 feet X 18 feet. Sufficient light was used in the auditorium to permit student note-taking; the light intensity throughout the hall varied from approximately 6 to 10 foot candles on the note-taking surface.

---

[1] The information is abstracted from a bulletin published by the manufacturer of the system, Eidophor--A Control Layer Television Projector (New York: CIBA, 260 Madison Avenue, n.d.).



Eidophor Large-Screen TV Projector

The Auditorium Projection Booth.

The projection room measures 16 feet X 22 feet and has three 1 foot x 2 feet and five 1 foot x 1 foot, projection ports, usable with either the Eidophor or standard motion picture projection equipment. The ceiling has ventilation ducts for the removal of carbon arc gases from the film projectors and ozone produced by Eidophor projectors. The room has a house light selector and dimmer, and audio switching control and audio amplifier, a remote control projection screen control, a closed-circuit receiver, video and audio monitoring equipment, and a direct line telephone connection with the TV production center.

The Large-Screen Distribution System.

The Jospeh Smith Auditorium is across campus from the TV studios and TV production center, which necessitated the incorporation of a high quality radio frequency closed-circuit video transmitting and receiving system linking the videotape playback equipment in the studios with the Eidophor system in the auditorium.

The ITV Studio.

The studio facility used is typical of those found in small TV production centers. Few changes in the electronic equipment aside from the addition of the Teledesk (see Special Equipment) were necessary in producing history lectures in this facility. The 25 feet X 26 feet studio was equipped with a lighting grid, lighting controls and assorted spot and flood lights; an RCA TK-10A 3-inch image orthicon camera; and RCA lavalier-type microphone; the Teledesk; and a control room equipped with an Ampex VR 1100 videotape recorder, video switcher, film-slide projection equipment, and audio and visual monitoring equipment.

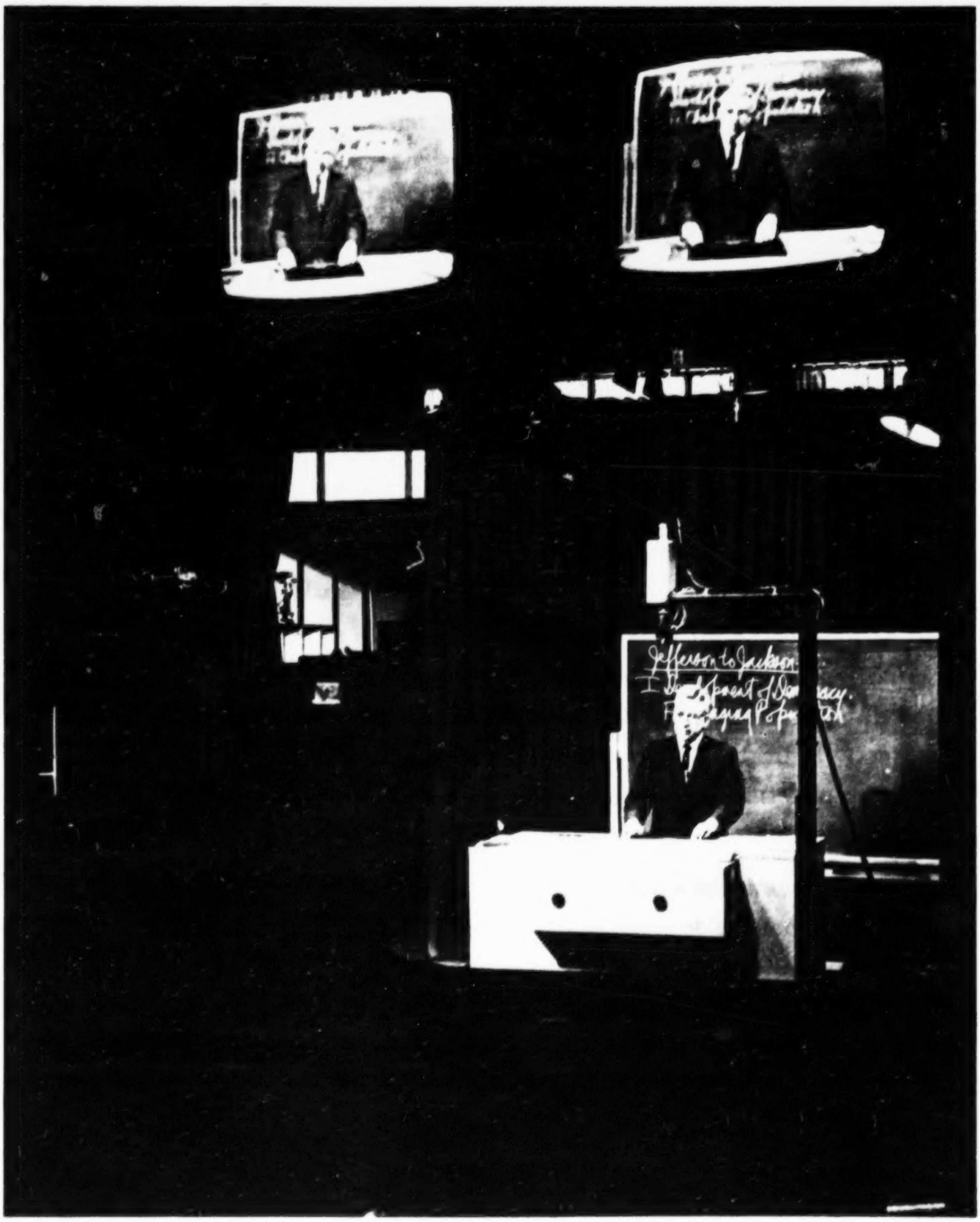
Special Instructional Equipment.

The Teledesk. In order to experiment with the philosophy of the instructor-directed television lecture, a specially designed teaching station, christened "Teledesk," was designed and constructed, which gives the teacher virtually complete control of all instructional elements of his television lecture. Films, slides, and a variety of other visuals of his own selection may be introduced at such times and for such intervals as he wishes.

The instructor selects the desired video source by means of an overall control panel located on the rear side of the desk, waist high, and to his left. This panel contains a small two-box video switch with three modes: cover camera (on which he appears when desiring to address the class directly), overhead camera (with electrically controlled zoom lens for picking up visual materials on the desk working surface), and film-slide source controlled remotely from the desk. Each of these sources is equipped with a Sony 5-inch video monitor mounted on a recessed portion of the front of the desk, permitting the instructor to preview any source before punching into program.

The control panel also includes a film projector stop-start switch, a slide change button, the overhead zoom control and a timeclock start and reset button for timing the program.

Instructional Television Studio Viewed From the Control Room



Instructional Television Studio Viewed From the Control Room

CHAPTER III

INSTRUCTIONAL EFFECTIVENESS OF LARGE-SCREEN TV

The Research Hypothesis.

On the basis of the many studies showing no significant difference in learning between students taught by conventional face-to-face and conventional television instruction, and previous Pennsylvania State University studies showing a comparable correlation between face-to-face and large-screen TV instruction, part of the B.Y.U. study was designed to test this hypothesis: There is no significant difference in measured academic achievement between students taking a college-level course via face-to-face instruction, conventional monitor-type television, or large-screen instructional television.

The same inquiry was also intended to provide information about instructional methods, student and teacher attitudes, and other phases of the study.

The Experimental Design.

The study provided an experimental environment for a systematic investigation of the effects of a single variable--method of communication from teacher to class--when other factors such as teacher, texts, course content, tests, and course administrative procedures were held relatively constant. Correlations were to be noted between this independent variable and a dependent variable--measured academic achievement of the subjects.

The design used a technique in which samples were drawn by a system of random numbers from the total student population of a specific course. The experimental variable was introduced to only one sample and the control treatment to the other. This technique assumes that any uncontrolled factors which might bias the experiment will have an equal opportunity of affecting either treatment, an assumption obviously not axiomatic.

The Experimental Classes.

The instructional vehicle for this and other parts of the study was History 170, a three-semester-hour course in United States history and institutions which is required of almost all B.Y.U. students. This course previous to

1964-1965 had been taught in approximately ten sections, averaging 150 students, each semester, using a basic lecture format and occasional film presentations. There had also been optional help sections conducted by graduate assistants who also handled the course paperwork.

Three factors were largely responsible for the selection of History 170: First, the course serves a large number students and the number of qualified teachers was limited; second, History 170 has the potential of using a wide variety of visual elements in a television format; third, an experienced lecturer, Dr. Richard D. Poll, was available and willing to assume instructional responsibilites for this pioneer project in educational television at Brigham Young University.

The first large-screen TV offering of the course was to two large sections in the Fall Semester, 1964-1965. Because the remodeling of the Joseph Smith Auditorium was still in progress, these classes met for six weeks in a semi-finished theater. Technical problems incident to this being the first videotaped and Eidophor-projected class led to some distractions and the occasional necessity for substituting a live lecture. Dr. Poll and the production personnel also had opportunity to work out some of the problems and possibilities of the Teledesk and other facilities. A survey of student opinions was made at the end of the semester for possible use in connection with the controlled studies which were planned for the following semester.

The Student Sample.

The total population from which the samples were drawn was 1,133 Brigham Young University students enrolled in History 170 in the Spring Semester, 1965. The section which met at 11 a.m. on Monday, Wednesday and Friday enrolled 601 students; the 1 p.m. section on the same days numbered 432. No attempt was made to fill the auditorium to capacity, and early morning and late afternoon conventional lecture sections served another 300 students.

Enrollees at the 11 a.m. period were divided by a system of random numbers into two groups. Section 40, the control group of 127 students, met with the instructor in Room 174 of the Joseph Smith Auditorium where the pre-taped lectures were presented by means of the Eidophor system, with teaching assistants in charge of record keeping and other class business. Weekly discussion meetings, taught by graduate assistants, were available on an optional basis to the members of both groups. On six occasions the control section met with the TV group for films or videotaped debates which could not conveniently be presented separately, and for the last unit of the course, another five meetings, this section was combined with the TV group to discover any differences in their performance on the final quiz and to give them opportunity to react to the large-screen medium.

Students enrolled at 1 p.m. were similarly divided into two groups. Section 50, the control group of 47 students, met in Room 275 of the Joseph Smith Building, where they witnessed the videotaped lectures on two 24-inch TV monitors with a teaching assistant in attendance. Section 51, 385 students, met in the Joseph Smith Auditorium under the arrangements described for Section 41. Discussion meetings were available to these sections, and the students of Section 50 met with the auditorium class twice early in the semester while the monitor installation was being adjusted and three times later for films.

The 11 o'clock sections thus permitted comparison of the instructional effectiveness of conventional face-to-face lectures and lectures mediated by large-screen TV. The 1 o'clock sections permitted comparisons of conventional instructional television and large-screen instruction.

Statistical Treatment of the Test Data.

Seven bi-weekly quizzes (30 objective questions) and a final examination (100 objective questions) were given to each of the four sections. Sections 40 and 41 took the same tests; Sections 50 and 51 also took identical quizzes, which paralleled those given to the 11 o'clock groups in content but not language. The quizzes and final were machine-scored and computer-analyzed, each of the four sections being treated separately so that comparisons could be made of individual test items as well as over-all group performance.

A "t" test was used on the quiz and examination results from Sections 40 and 41 to test this aspect of the hypothesis: There is no significant difference in measured academic achievement between students taking History 170 by traditional face-to-face instruction and students taking the course by large-screen TV instruction. On tests 1, 2, 3, 4, 6, 7, and the final examination, the "t" test showed no significant differences in academic achievement at the .05 level of significance. (See Appendix A, Part I.)

A "t" test was also used for Sections 50 and 51 to test the second aspect of the hypothesis: There is no significant difference in measured academic achievement between students taking History 170 by conventional 24-inch instructional television and those taking the course by large-screen TV. The "t" test showed no significant difference at the .05 level of significant difference on tests 1, 2, 3, 6, 7, and the final examination. Tests 4 and 5 showed a significant difference in favor of Section 50, the control group, at the .05 level of significance. (See Appendix A.)

Significance of the Findings.

The findings of the History 170 test analyses, in general, confirm the hypothesis in both of its aspects. They thus support the previous Pennsylvania State University large-screen television studies in which no significant differences in academic achievement were noted between students taking college-level courses by conventional 24-inch television and those taking the same courses by large-screen TV. They further tend to confirm the assumption in the Pennsylvania State University studies that there may be no significant differences in measured academic achievement between students taking courses in the traditional face-to-face lecture situation and those taking the same courses by large-screen instructional television.[1]

---

[1] The fact that the observable differences in measured achievement, although rarely statistically significant, favored the control groups in all except one instance, invited some feflections on possible causes. Certain differences in reported attitudes between the students in the auditorium sections and in the control groups (see the section on student attitudes) were also noted. This study was not structured to probe these trends or tendencies indicated in the data.

CHAPTER IV

VIEWING ANGLE, DISTANCE, AND LARGE-SCREEN ITV LEARNING

The Problem.

In the large-screen ITV environment all instructional information comes from the viewing screen and the audio system. Each student in this instructional situation is stationed in a specific location in reference to the sources of video and audio information. In a large auditorium or classroom, such as that used in the History 170 experiments, there is great variance in the distance and viewing angles for individual members of the class. Considering this variance, it is logical to ask the question, How important is student location in the large-screen TV environment? Or more specifically, "Is there a relationship between student achievement and student location in this environment?"

Related Research.

It is common knowledge that there is a decrease in the reflected light level as one moves at an angle from a perpendicular to the plane of the motion picture viewing screen. Information prepared by the Educational Facilities Laboratories recommends that the angle of student placement from a perpendicular to the plane of a TV screen not exceeding 45 degrees, and also recommends that the viewing distance for a TV screen not exceed a minimum of two screen widths or a maximum of six screen widths.[1] There appears to be no extensive research to support these recommendations, but they are widely accepted as a rough guide. The large-screen TV study at B.Y.U. operated within these tolerances by the nature of the physical facility rather than by design.

Research Design.

The Joseph Smith Auditorium provided a student placement variable of 40 to 90 feet distance from the screen and a viewing angle variable of 0 degrees to 45 degrees from a perpendicular to the plane of the screen at its center. Students were assigned to specific seats in the auditorium and received all instruction for the entire course from the same location in respect to the sources of visual and oral stimuli.

---

[1] Dave Chapman, Inc., Design for ETV, Planning for Schools with Television (New York: Educational Facilities Laboratories, 1960), p. 38.

Since the students had been randomly assigned seating locations, any marked variations in grouped performance could result from auditorium location. A simple study to investigate any such relationship to academic achievement was made. Using the seating charts for Section 41 of History 170, six samples of twenty-five students each were drawn from the total population of the class. Sample One consisted of twenty-five students from the left front part of the auditorium; Sample Two, the center front; Sample Three, the right front; Sample Four, the left rear; Sample Five, the center rear; and Sample Six, the right rear part of the hall.

The accumulated scores for the seven quizzes and final exam given to each of the students in each of the samples were determined from class records with the help of the IBM 7040 Computer. Then, using the analysis of variance technique, the total test performance of the six samples was compared by the computer.

Statistical Results and Conclusions.

Table I shows the results of the analysis of variance.

TABLE I

Results of the Analysis of Variance Showing Relationships Between Student Location and Test Performance for Six Samples of Twenty-Five Students in History 170, Section 41

Source	DF	Sums XX	Mean X	F	Pr
A	5	97327.0195	19465.4038	1.400	$P > .05$
Error	144	2002190.4688	13904.1055		
Total	149	2099157.5000	13904.1055		

The results of the analysis of variance show no statistically significant difference in performance among the six sample groups at the .05 level of significance. It may therefore be assumed that there were no measurable differences in learning or information gain as a result of student locations in the auditorium.

The results of the study of distance and viewing angle from the TV screen indicate that, for the Eidophor large-screen projection system, no significant variance attributable to these factors occurs when the following specifications are maintained: The location of students does not exceed a viewing angle greater than 45 degrees from a perpendicular to the center of the viewing screen and the viewing distance is no less than two screen widths and no greater than six screen widths from the viewing screen.

CHAPTER V

STUDENT ATTITUDES TOWARD LARGE-SCREEN ITV

The Problem.

It is difficult to identify, measure and evaluate student attitudes in an emerging educational program; yet an awareness of such attitudes is very helpful in designing and evaluating any pioneer instructional activity. The effectiveness of any teaching method or device should be judged in the total learning situation, which includes not only the factual material and empirical results of tests, but also the student preconditioning, mental set, and response to the instructional environment.

The large-screen television instructional environment was outside the previous experience of all participants in the History 170 study at B.Y.U. Related experiences such as movie attendance and commercial television viewing, where the entertainment function is paramount, may probably be considered as negative preconditioning. The absence of the traditional student-teacher relationship may have created anxiety and negative responses among students.[1]

A knowledge of student responses and resulting attitude patterns would help in assessing the need for orientation procedures. If there is little anxiety or negative response from student participants, there is probably little need for extensive orientation and preparation activities. If, however, there is evidence of hostility and negative attitudes among the students, detailed preparation and orientation procedures are imperative.

---

[1] The History 170 TV course encountered some student resistance, particularly in the first semester. When the word circulated that the course was being presented on the large-screen, a few students changed their registration plans for the Fall Semester to postpone taking the class. This resistance was less apparent at registration in the Spring Semester, but there is no hard evidence on which to determine whether this shift represented conversion or simply resignation.

A knowledge of student responses and resulting attitude patterns would help in assessing the need for orientation procedures. If there is little anxiety or negative response from student participants, there is probably little need for extensive orientation and preparation activities. If, however, there is evidence of hostility and negative attitudes among the students, detailed preparation and orientation procedures are imperative.

The Research Design.

Students registering for History 170 were not given a choice between conventional instruction and large-screen television, but with the exception of the control groups they were required to take the large-screen version.[1] The only attempt to relieve student anxieties or misunderstanding concerning the large-screen instructional environment was the introductory lecture, videotaped, in which the objectives of the study, the purposes and organization of the course, and the capabilities of the Teledesk and the large-screen medium were explained and illustrated. Adjustment of the students to their new environment was largely personal and without outside assistance.

Before attempting to initiate any more comprehensive orientation program, it was judged desirable to know the magnitude and direction of the student response to the first large-screen presentations at B.Y.U. The instructor also wishes to assess student responses to texts, teacher performance, class helps, and other aspects of the course. For these purposes the following evaluational procedures were used in sections of History 170 covered by this study:

1. An opinion questionnaire of 28 items was completed by all students taking the last quiz, machine-tabulated and computer-analyzed. A summary of findings is presented in Appendix C.

---

[1] When the announcement of these plans was made at the first class meetings, less than a dozen students requested to be transferred from the sections to which they were assigned, and the requests to move into the large-screen sections were almost as numerous as the requests to move out. (It is possible that the effect of the segregation existing on boy-girl relationships was the primary cause of these requests.)

2. Students were invited to submit a 250-word critique of the course, with emphasis on shortcomings and possible improvements. Approximately 250 students responded. The papers were read by Dr. Poll and a summary of the suggestions is in Appendix D.
3. Bi-weekly seminars with the eight teaching assistants considered both procedural and content aspects of the course.
4. Periodic conferences were held with the production staff, most of whom visited the TV sections several times during the year.

Findings and Interpretations.

The kinds of information sought in this part of the study were essentially subjective and interpretive, not amenable to rigorous statistical treatment. Student responses on the following itmes from the questionnaire bear particularly on the subject of student attitudes foward the large-screen medium of instruction. The figures are percentages.[1]

Question 4. Approximately what is your cumulative grade-point average up to the beginning of this semester?

	Section 40	41	50	51
(1) Above 3.0	18	17	26	19
(2) Between 2.5 and 3.0	33	30	26	31
(3) Between 2.0 and 2.5	28	36	31	26
(4) Between 1.5 and 2.0	17	13	12	17
(5) Below 1.5	3	3	5	3

While the student estimates are probably optimistic, they suggest that in terms of academic record, the student samples were quite comparable.

Question 8. In comparison with other lower division college courses which you have taken, how do you rate the tests in this course?

	Section 40	41	50	51
(1) Very difficult	17	24	26	31
(2) Moderately difficult	60	51	48	44
(3) About average difficulty	19	21	26	21
(4) Moderately easy	4	4	0	3
(5) Very easy	0	0	0	0

---

[1] As noted earlier, Section 40, 127 students, attended face-to-face lectures taught by the same instructor, except for 3 films, 3 videotaped debates, and 5 videotaped lectures by Dr. Poll, which they shared with Section 41, 474 students, the large-screen experimental section. Section 50, 47 students, took the course via 24-inch TV monitors, except for 2 videotaped lectures and 3 films which they shared with Section 51, 385 students, the second large-screen experimental section.

The responses make clear that History 170 is not a "snap" course (and possible suggests that Dr. Poll should review his testing standards).

Question 10. What is your evaluation of the discussion sections as aids in the course?

	Section 40	41	50	51
(1) Very helpful	11	21	17	23
(2) Helpful	45	40	57	36
(3) Of little value	18	14	21	18
(4) I have attended none	26	23	24	23

Since one of the chief reasons for having discussion sections with optional attendance was to relieve student and teacher anxiety about the loss of student-teacher interaction, it is interesting to note the high percentage who did not feel the need for such interaction, at least with sufficient urgency to make the effort required by section attendance.

Question 14. Using your own experience in other large (100 students or more) classes for comparison, how does the use of TV affect the learning experience?

	Section 40	41	50	51
(1) Learning is more difficult when TV is the medium of instruction	54	36	29	35
(2) Learning is equally difficult (or easy) in the TV class and conventional lecture classes	18	36	33	39
(3) Learning is less difficult in the TV class	4	16	29	13
(4) I have no basis for comparison	21	10	7	10

In all sections the majority of the students considered learning through TV to be equally difficult or more difficult than learning from conventional instruction. Clear but not surprising is the observation that students in the section taught in the face-to-face mode, with only a limited exposure to television instruction, had a much higher percentage who felt learning to be more difficult when TV is the teaching medium. This response bears out the general finding of research that those students and teachers with the least experience with instructional TV are the most negative toward it.

Question 15. How do you rate the technical quality of the television production in this course?

	Section 40	41	50	51
(1) Very good	15	17	21	18
(2) Good	50	52	49	57
(3) Fair	18	26	19	27
(4) Poor	1	3	2	5
(5) No opinion	16	1	0	1

The technical quality of the TV production was of sufficiently high quality to arouse little negative criticism.

Question 16. How much does the use of visuals (maps, pictures, films, slides, taped sounds, etc.) contribute to this course?

	Section 40	41	50	51
(1) Very much	27	66	67	64
(2) Some	51	29	31	31
(3) Very little	11	4	0	2
(4) None	5	0	0	1

It is notable that each of the TV sections placed a much greater value on the use of visual materials than the students in the conventional lecture section, to whom fewer visual aids could be presented.

Question 17. How do you rate the over-all quality of the content of the visuals used?

	Section 40	41	50	51
(1) Excellent	11	29	24	28
(2) Good	53	55	60	60
(3) Fair	16	13	9	10
(4) Poor	1	1	0	1
(5) No opinion	18	1	5	0

As in question 16, the response of the TV sections was much higher than the conventional lecture section, for whom problems of presentation possibly reduced the value of the visuals used.

Question 24. In comparison with other lecture classes which you have taken, how do you rate the lectures in this class?

	Section 40	41	50	51
(1) Above average	65	42	52	40
(2) About average	27	45	29	46
(3) Below average	4	9	12	11

The response to the lectures is generally favorable, with the students in the face-to-face class showing a perceptibly more affirmative response than their TV contemporaries. Since the videotaped lectures regularly covered the subject matter more completely, with better balance in time distribution and more effective use of visual aids, this response appears to stem from subjective factors in the relationship of the students to the television medium and the large-screen, large class format in particular. The inability of the TV lecturer to sense changes in the mood of the class, or to adapt to accidental occurrences which sometimes distract it, is probably also involved.

Question 25. In comparison with other lower division college level classes which you have taken, how do you rate this class in over-all quality?

	Section 40	41	50	51
(1) Above average	33	29	45	27
(2) About average	53	55	41	57
(3) Below average	8	11	5	10

Here the students have again taken a generally affirmative view. The favorable reactions of the monitor section on questions 24 and 25 lend corroboration to the hypothesis that TV is as effective a medium of instruction as traditional face-to-face instruction. That the reactions from Sections 41 and 51 are somewhat less favorable is both apparent and provocative.

Question 26. If a good friend asked your advice on whether to take the TV section of History 170 next semester or to take a regular 200-student lecture section under a comparable instructor, what would you reply?

	Section 40	41	50	51
(1) Take the regular lecture section of History 170.	67	34	19	36
(2) Take the TV section	11	43	55	37
(3) You have no preference one way or the other.	12	10	12	14
(4) You have had no experience with another large lecture class on which to base a comparison.	6	8	7	10

It is interesting to note that in each of the television sections the majority would recommend ITV History 170 over the conventional lecture system, while the face-to-face lecture class was overwhelmingly in favor of that method. The differences between the two control sections (40 and 50) are particularly striking.

Question 28. Insofar as you have been able to observe it over this semester, how would you rate the student deportment in this class in comparison with other large (100 students or more) classes which you have attended?

	Section 40	41	50	51
(1) This class is much better	22	5	5	4
(2) This class is a little better	31	16	17	13
(3) This class is about the same as others	38	48	60	49
(4) This class is a little worse	4	18	21	10
(5) This class is much worse	0	5	0	5

While these findings confirm that the face-to-face situation gives the instructor better control over classroom discipline, the evidence of significant deportment problems in the two large-screen sections is most relevant to this study.

Summary and Conclusions.

The survey of class opinions in the History 170 project confirms that the students approach large-screen ITV with certain predispositions and anxieties. That proper orientation procedures will correct these misapprehensions and relieve these anxieties is a hypothesis not tested in this study; it is observable that they were reduced but not fully removed with the subject classes. The reactions of the students in the large-screen sections were, on the whole, favorable, and as noted earlier, their learning achievement was comparable to that of the control sections.

It seems a safe observation that very large lecture classes present special problems in student motivation and morale, which may be accentuated in the large-screen ITV context. It also appears likely that increased utilization of large-screen instruction will alleviate some of these problems, even as the growing use of monitor-TV at all levels of instruction has already conditioned many college students to learn as effectively, and possibly as happily, from this medium as from live instruction.

If the observable differences in student attitudes in the auditorium sections of History 170 and the control groups are in part functions of the impersonality and student anonymity of very large classes, whatever the communication medium, then orientation procedures in large-screen classes whould attempt to deal with the problem. The introductory lecture in History 170 did not consciously do so; the capabilities of the Teledesk were demonstrated along with some of the audio-visual materials and special features planned for the course, but primary emphasis was on course content and procedures. The student reaction to the opening presentation was not tested but appeared favorable, and the one group (Section 50) which experienced a projector failure during that lecture may have labored under a handicap for the rest of the term.

The student response in History 170 was in general favorable to large-screen television. Those students most critical of the large-screen television teaching situation were the students in the control group who were receiving instruction by the conventional classroom lecture method. It was observed that in general the more familiar the student became with instruction mediated by television, the more positive his attitudes became toward this method of instruction.

The study of student attitudes suggests that there is a need for a carefully prepared orientation program which should precede the student's first exposure to instructional television.

It must be remembered that commercial TV is watched primarily by individuals or small groups sitting close to the screen in a home environment. They are watching primarily for entertainment, not learning; they view less critically and often miss or watch passively parts of the program.

The ITV student, on the other hand, must be an attentive viewer, alert to detail. He may also be less favorably situated with reference to the screen than in optimum home viewing. And he may even be involuntarily present. Under these circumstances, all forms of educational television, including the large-screen version, require special attention to clear and precise visual and audio communication.

CHAPTER VI

FACULTY ATTITUDES TOWARDS ITV

Introduction.

The decision to incorporate large-screen instructional television into the Brigham Young University curriculum raised the question of faculty attitudes regarding such a move. It was considered important to be aware of the degree of over-all acceptance or hostility, and to know from what quarters the ITV program could expect the greatest resistance and the greatest support. In the initial phase of the program it was deemed wise to deal directly with those faculty members and academic areas most willing to support the large-screen project. The findings might also be helpful in developing orientation procedures for teachers facing ITV assignments.

Related Research.

In a study by Richard I. Evans, Ronald G. Smith and William K. Colville, it was found that the majority of educators have been slow in accepting television as a medium of instruction, and that for the past decade there has been a predominance of negative attitudes, particularly at the university level.[1]

Donald W. MacLennan and T. Christopher Reid noted that negative attitudes insofar as teaching personnel are concerned have been the major obstacle to the adoption of instructional television at most universities. Nevertheless, when the need for ITV had been justified in terms of increasing enrollment and staff shortages, there was usually a sufficient number of qualified teachers willing to prepare and present such courses.[2]

---

[1] Evans, Richard I., Ronald G. Smith and William K. Colville, "The University Faculty and Educational Television: Hostility, Resistance, and Change:" (Texas: University of Houston, 1962) p.1. (mimeographed.)

[2] MacLennan, Donald W., and J. Christopher Reid. *Instructional Television and Film, An Annotated Bibliography*. (University of Missouri: Institute for Communication Research). Vol. I. p. 21, (mimeographed).

In a study to determine attitudes of university professors toward ITV before and after participating in the making of videotapes, Evans, Smith and Colville administered a questionnaire using the semantic differential to 319 University of Houston faculty members. The results of the study indicated that members of the departments who participated in the videotape project were modified in a direction more favorable to ITV.[1]

Stanley D. Handleman conducted an attitude study in which ten questionnaires were sent to each of forty colleges and universities having closed-circuit television. From the returns of 24 instructors, he found that teachers who had taught by television had a significantly more favorable attitude toward the medium than teachers who had not so taught. A significantly positive relationship existed between length of time in TV teaching and strength of positive attitudes.[2]

In summary, the findings of studies of college teachers' attitudes toward instructional television are, in general, negative. It is also found that there is a positive correlation between attitude and experience with ITV, the most negative attitudes being with those who have had the least contact.

Research Design.

None of the previous studies have shown the relationships of faculty attitudes and such variables as age, sex, academic rank and academic degrees. In the thought that an identification of the relationship of these variables to either positive or negative attitudes would give valuable guidance in developing an ITV program at the university level, an attitude study was initiated as part of the large-screen instructional television study.

For the purpose, a questionnaire with a 20 item attitude scale was constructed. (See Appendix E.) The instrument was administered by mail to 672 members of the teaching faculty at B.Y.U. The 329 questionnaires returned were subjected to the Guttman technique of scalogram analysis. Five items from the original 20 were found to be unidimensional toward the attitude universe of instructional television. The respondents were then ordered according to their responses on the scale and assigned to one of the six scale types. Those having the most negative attitudes toward ITV were classified as scale type one, while those with the most positive attitudes toward ITV were classified as scale type six.

---

[1] Evans, op. cit., p. 16-17.

[2] MacLennan, op. cit.

Five independent variables were used to discover if their relationship to instructional television attitudes was a determining factor in the existence of such attitudes within different departments and colleges of the university. The five variables used were: faculty rank, highest academic degree earned, prior experience with instructional television, sex and age. Each variable was cross-classified with the respondents' scale score for statistical analysis by the B.Y.U. Computer Research Center's IBM 7040 computer.

Two limitations of the study should be mentioned. First, the sample used for computing statistical correlations was unequal, the majority of respondents being classified as having negative attitudes toward ITV. This unequal distribution, especially in the college and departmental groupings, would tend to add bias to the final results of the study. Second, the unidimensionality of the attitude scale used in this study is relative to both time and sample. The reliability of the scale today may not hold at a future date, even when used for the same sample.

The Sample.

The universe from which the sample was taken consisted of 672 members of the teaching faculty, excluding administrative and staff personnel not engaged in teaching. Three hundred twenty-nine faculty members responded (48.95%). The percentage distribution of respondents according to academic degree and faculty rank was used to compare the sample with the universe to determine its representativeness. Table I shows the results of this comparison; because the percentage differences were not large, the sample was judged to be representative of the total universe.

Statistical Analysis.

From the responses to the attitude index, the respondents were classified into six scale types, as described. Table II shows the distribution of faculty members according to scale type and items responded to in a negative direction. It is observable that the B.Y.U. faculty was generally unfavorable toward instructional television; the distribution was skewed with the greatest number of respondents at the negative end of the scale and the median falling in scale type two.

TABLE I

PERCENTAGE DISTRIBUTION OF RESPONDENTS FOR SAMPLE AND UNIVERSE ACCORDING TO FACULTY RANK AND ACADEMIC DEGREE

	TOTAL UNIVERSE *N=658	SAMPLE	DIFFERENCE BETWEEN SAMPLE AND UNIVERSE
FACULTY RANK	PERCENT	PERCENT	PERCENT
Professor	23.3	27.6	4.3
Associate Professor	17.3	21.2	3.9
Assistant Professor	29.3	27.0	2.3
Instructor	30.2	24.2	6.0
		N=326+	
ACADEMIC DEGREE			
Doctorate	46.4	52.6	6.2
Master's	43.4	35.6	7.4
Bachelor's	10.6	11.8	1.2
		N=329	

* Percentages for the total universe were taken from the most recent university research available, September 1964.

+ Three respondents in the sample did not identify their faculty rank.

To facilitate statistical analysis of the data, the scale types were trichotomized as shown in Table II by the dotted lines. Following this, a series of contingency tables were set up for each department to measure the significance of the observed differences and the degree of association between scale types and the variables of age, sex, faculty rank, highest academic degree, and prior experience with ITV.

Because of the nature of the data and the size of the contingency tables, the Z test was used to determine whether the observed differences were significant between the independent variables and the index scores. Kendall's Tau C. was used to determine the rank order correlation of the variables.

TABLE II

NUMBER AND PERCENTAGE DISTRIBUTION OF FACULTY MEMBERS ACCORDING TO SCALE TYPE AND RESPONSE TO SCALE ITEMS

SCALE TYPE	NUMBER	PERCENT	SCALE ITEMS ANSWERED NEGATIVELY
6 (Positive Attitudes)	16	4.9	None
5	52	15.8	6
4	25	7.6	6,7
3	58	17.7	6,7,2
2	75	22.8	6,7,2,1
1 (Negative Attitudes)	103	31.3	6,7,2,1,16
TOTALS	329	100.0	

Tau C is a measure of the degree of association between two variables when large tables are used.[1]

Summary and Conclusions.

As a whole, the Brigham Young University faculty is unfavorable toward instructional television. The general feeling is that: (1) information gain would not be as great in ITV courses as in conventional courses; (2) the presence of the teacher in the classroom overrides the advantages of instructional television; and (3) instructional television would result in the loss of teaching effectiveness. It was also felt that personal satisfaction derived from teaching could be lost through the use of ITV. The majority of respondents did, however, believe that television could be easily adapted to some of the courses they taught.

Age was not significantly related to the ITV attitudes of the B.Y.U. faculty. Male faculty members were slightly more favorable that were female faculty. In a majority of the departments studied, it was found that the higher the faculty rank, the more favorable the respondent was toward instructional television. Respondents having earned the highest academic degrees were found to have slightly more favorable attitudes. For the total sample, prior experience with instructional television also had a slight positive relationship to favorable attitudes, but like all other variables was not found to be statistically significant.

---

[1] Blalock, Hubert M., Social Statistics. (New York: McGraw-Hill Book Company, Inc., 1960) p. 317-324.

It is recommended that further research on faculty attitudes seek methods of overcoming the negative attitudes which observably exist. The further conclusions seem warranted that any orientation program designed to increase faculty understanding and acceptance of ITV should be aimed at a cross-section of the teaching staff, and that orientation procedures for teachers who are moving into ITV will vary more according to the requirements of particular courses than to differences in understanding and attitude among the teachers.

CHAPTER VII

LARGE-SCREEN ITV PRODUCTION TECHNIQUES

Introduction.

This part of the study will identify existing instructional television techniques, distinguish which are readily adaptable to large-screen ITV, and note new presentational techniques which may be used specifically with that medium.

Available ITV Techniques.

For the initial identification, the general area of ITV is divided into the following categories: fully televised lecture techniques; partially televised lecture techniques; video presentation variables; instructor variables, set variables, camera and other production variables.

The fully televised course; This is one in which the teacher's full instructional contribution is made via the television screen.[1] The visual materials incorporated in the lectures will vary in quantity and type with the course content. It has been observed that in general the more visuals used, the greater the attention of students and the greater the potential for learning, provided that the visuals support the concepts being taught. Many varieties of audio-visual material useful in ITV presentations, and some cautions concerning their use, have been noted in connection with the History 170 experiment. Detailed information on the construction and use of such visual aids may be found in most TV production handbooks.

The observation that the attention span of students appeared to lengthen with the use of movement in the visual materials suggests the particular value of such TV media and techniques as animated charts and graphs, film clips, panning or zooming with still pictures, and the use of non-stationary models and artifacts. Because interviews, panels and other group presentations involve motion and interaction, they can also sustain student attention better than some conventional monologues.

---

[1] When optional or cumpulsory discussion groups are held in connection with such courses, as in the History 170 experiment, their function is to reinforce and clarify the lecture content, not to supplement it.

A TV lecture in which no visual aids are used is usually acceptable only in the case where the personality and bodily movement of the instructor will maintain attention and interest. In general the ITV presentation must have multiple visual stimuli if it is to be effective.

The Partially Televised Course; It is often desirable for the classroom teacher and the television teacher to combine efforts to present a single lesson or series of lessons. This is more common in elementary and secondary schools than in colleges and universities.

Generally speaking, it is difficult for a classroom teacher to maintain surveillance and discipline in the classroom while setting up and presenting complex demonstrations or putting a large amount of material on the blackboard. Moreover, many schools do not have either the facilities, personnel or time to create many very useful demonstrations and experiments in the classroom. Even the simple mechanics of setting up a projector and operating it for a segment of a class period may disrupt the class and negate the teaching value of the film presentation.

Most of the difficulties and negative factors associated with demonstrations and audio-visual equipment may be eliminated by the combined efforts of the classroom teacher and the television teacher. Without loss of time or discipline and with very little effort on the part of the classroom teacher television may enrich many classroom presentations.

It is important to note that the successful partially televised course of this type involves the following considerations: joint pre-class planning by classroom teachers and the TV teacher; in-class preparation for the TV portion of the lecture; immediate overt or covert responses from students during and following the TV presentation; and careful integration of classroom activities and TV lectures. The TV lecturer should concentrate on presenting the type of information or demonstration not readily available in the classroom. Under no circumstances should the relationship of classroom teacher and TV teacher become a talent contest.

Another type of partially televised presentation involves the use of a "demonstration camera" by the instructor in the classroom. Its primary function is to show extreme close-up or fine detail of an object, model, picture or demonstration not easily seen by the entire class. The camera may be mounted in an overhead position above the lecture desk, or it may sit on a camera mount. Science classes at any educational level may make particularly effective use of this technique.

Video Presentation Variables. Four optional forms of video presentation will be considered: the live studio or classroom originated lecture; the live studio or classroom studio originated lecture with simultaneous videotape recording; the pre-videotaped lecture; and the filmed or kinescoped lecture presented via television.

The first type is delivered to the students as it is presented in the originating environment. No provisions are made for retaining any portion of the televised lecture; it is a one-time only presentation. The live lecture may, however, be sent to one or many classrooms simultaneously via coaxial cable.

The live studio or classroom studio presentation with videotape recording is merely a modification of the first type. This technique provides the capability of repeating the identical lecture at other hours or at later times by videotape playback.

The pre-videotaped lecture is prepared prior to the actual presentation to the class. As noted in the History 170 report, this technique provides the capability of eliminating mistakes or shortcomings in the lecture as first presented, which the first two presentation variables mentioned lack. This technique has proved helpful in relieving much of the anxiety common to teachers unfamiliar with the TV studio situation.

The filmed or kinescoped lecture is merely a lecture presentation recorded on motion picture film; the cost is so great that it is rarely used in presenting a series of classroom lectures. It has been employed extensively in educational television broadcasting, but it is being displaced by the videotape system. The principal objections to kinescope recordings are the marked loss in quality and the unpredictability of the recording mechanism. The chief advantage is that the kinescope recording may be used with any good 16 mm. sound projector.

Instructor Variables. The most common ITV lecture situation, particularly at the college level, involves the appearance of only one lecturer. He presents all lectures and selects all audio-visual materials to supplement them, ideally with the assistance of a television producer and a TV arts and graphics department. With a few exceptions previously described, this was the case in the History 170 experiments.

A modification of the single lecturer format is when the lecturer invites guests, who may be campus or off-campus specialists or student participants. In most instances, the principal lecturer maintains control of each presentation and continuity for the entire series of lectures.

A third instructor variable is the team teaching technique, where various instructors are assigned full class periods in which to develop their own areas of specialization. The instructor in charge of such a course has primarily planning, coordinating and administrative responsibilities.

Set Variables. There are five basic types of sets commonly used in instructional television. The first is a simple pleated curtain, either dark, light or neutral, depending upon the action and properties for which it is background. Another simple set is the cyclorama, a taunt, non-pleated curtain enclosing the back of the set; it is usually a light color which gives the illusion of depth or infinity. The next simplest set is the painted drop, where background is actually painted on a large canvas. Next simplest, and most easily changed, is the rear screen set, where a projection machine projects the scene or set background upon a translucent screen and the performers appear in front of that screen; thus, a simple slide change gives a new set. The fifth set variable is the practical set, where doors, windows, properties, etc., are used to create the illusion of home, schoolroom, interior or exterior locations.

Camera Variables. These may include the types and numbers of TV cameras, camera positions on the set, and special effects cameras. Production factors related to camera variables may include camera editing, such as the camera cut and the camera dissolve, and camera movement, including dollying, panning, tilting or trucking. The number of camera variables is vast and need not be explored in this study.

J. P. Ellery, in a study at Wayne State University, found no significant differences in learning which could be related to such production variables as dollying vs. cutting, production errors vs. no production errors, the limbo set (no visable background) vs. non-limbo sets, and flat lighting vs. key lighting.[1] It is important to note that studies involving production techniques are particularly susceptible to the Hawthorne effect.[2] It is also possible that for a prolonged period, level of interest may become a significant factor in student learning. While the History 170 study did not provide data directly on this point, observation of the TV sections suggests that student interest is often a function of TV production technique.

ITV Techniques Unsuitable for Large-Screen Classes.

The traditional ITV production techniques which appear least suited for large-screen use are those which seek most closely to emulate conventional face-to-face instruction or traditional educational broadcasting.

Student-Teacher Interaction. Every TV presentational technique which has been found to have sufficient educational value to justify its use in monitor-TV instruction would appear suitable for large-screen application except those which seek to elicit an immediate covert student response, either through intercom contact with the instructor or through class responses or discussion.

In conventional closed-circuit television, considerable ingenuity has been employed to permit overt or covert student responses, using simple or complex feedback methods. Pennsylvania State University has had considerable success with an elaborate electronic communications system designed to provide immediate oral communication between the instructor and chairman in the multiple sections who are simultaneously witnessing his lecture by monitor-TV. In general, the major advantage of such intercom systems appears to be psychological. The student new to the ITV situation feels a need for contact with the teacher; once this capability is provided, he he is comforted and not strongly inclined to use the facilities.

---

[1] Ellery, J. B. "A Pilot Study of The Nature of Aesthetic Experiences Associated with Television and Its Place in Education." Wayne State University, Detroit, 1959. (mimeographed) p. 12.

[2] Cook, Desmond L. "The Hawthorne Effect in Educational Research." Phi Delta Kappan, 1962, Vol. XLIV No. 3. p. 16.

In any case, a pre-taped lecture precludes such inter-action while a live transmission from the studio to an auditorium-size class would require for such inter-action an electronic feedback system of infeasible complexity. The conclusion must be that a course which depends upon student-teacher interchange is adaptable neither to large conventional classes nor to large-screen ITV.[1]

Scripted Lectures. To the extent that existing educational TV broadcasting techniques are script-centered, their appropriateness for large-screen classroom instruction may be questioned. First, teachers who are deeply and continuously involved in exploring their subject will be reluctant to take the time involved in script writing and rehearsing and then will have difficulty in sticking to the script when the lectures are presented. Further, since few teachers are trained actors, the effort to remember and follow a script will produce a mechanical performance with diminished educational impact. A read lecture is a dead lecture. And finally, a scripted course is more likely to resist modification from semester to semester simply because of the extra work that revision involves for all parties concerned.

The instructor-directed lecture, such as Teledesk production permits, requires a detailed outline, of course, but it leaves the instructor free to respond to the "feel" of his subject and teaching materials as the lecture unfolds.

---

[1] There is reason to believe that a student who will ask a question in a class of several hundred people is more likely to be an exhibitionist than an earnest seeker after enlightenment. This might be a compelling argument against all large classes if it were not also observable that most student questions in college lecture classes represent tangible material, topics scheduled for later consideration, or status striving. Since a well-constructed ITV lecture will anticipate most relevant questions, it seems probable that if the instructor of a large-screen class makes himself available outside the lecture for those students who really want to discuss subject matter with him, the absence of opportunity for in-class questions is a negligible loss.

While an occasional hand-raising or yea-nay response was invited in the experimental History 170 lectures, it was primarily an attention-testing gimmick. Concert responses from classes of large-screen size may have limited teaching value to demonstrate differences in opinion or experience.

Partially Televised Courses. The large-screen medium has limited utility for partially televised courses. To justify its costs, large-screen TV is ordinarily used in classes with large enrollments, meeting in auditoriums or large classrooms. The partially televised course is generally used by the classroom instructor as a supplement to the normal fact-to-face presentation before a traditional-sized class (20 to 30 students); the condition is much more common today in grade schools and high schools than in higher education.

However, as a method for presenting enlargements of demonstrations being conducted in large university classes, large-screen ITV has great potential, as will be noted below.

Before leaving the subject, the differences in relationship between the television teacher and classroom teacher in a partially televised course and the instructor and group discussion leaders in a fully televised course should be pointed out. In the partially televised situation, the two teachers need to work closely together, sharing ideas and dealing with each other as equals in the teaching situation. No such equality of role or responsibility is obtained in the large-screen class; the discussion groups and their leaders become a function of the lecture, with no independent instructional task.

Special Large-Screen ITV Capabilities.

The fact that the 24 feet x 32 feet screen in Eidophor large-screen television can present a larger than life sized image of the instructor, objects, displays, or parts of the set has several important implications for instruction. In comparison with conventional TV instruction, the large-screen medium reduces the need for extreme close-up shots of the instructor to develop eye contact and empathy with the students. Several presentation variables thus become more functional.

The Lecture Setting. First, the instructor can be placed in a set more natural to the course he is teaching. The plain limbo or curtain background so often seen in conventional TV instruction can be eliminated. This lifeless background is used in monitor-type classes to avoid distracting attention from the instructor. In large-screen instruction the set can become busier--a simulated classroom, or a laboratory, library or studio filled with props related to the course of study. This is because the image of the instructor, in a medium shot, is still life-size or larger, in contrast to the diminutive image which the same shot produces on the 24-inch screen.

Demonstration of Objects. The second presentation variable which becomes more flexible in large-screen ITV is the extreme close-up shot of larger objects or displays than can be so presented on a monitor screen. The magnification capability of large-screen television is also limited by distortion (graininess) in the image after it becomes so big, but it substantially exceeds that of conventional TV. To illustrate: The ITV history professor may wish to show an extreme close-up of a map in a book. If the portion to be shown is two square inches in size, it can be effectively enlarged on the conventional screen to about 12 times its actual size. On the large-screen it can be enlarged to roughly 144 to 192 times its actual size, but the distortion would be immense. On the other hand, if the instructor wishes to show the entire map, the situation will be reversed. On the 24-inch screen the map will be only doubled in size, providing little visual relief, whereas the large screen image will be 24 times larger, providing much visual assistance in in seeing detail without serious distortion.

Larger objects, some even larger than conventional TV sets, can be magnified as much as 12 times or more on large-screen TV, whereas they are reduced in size when presented on the conventional monitor. The large screen permits large working models to be magnified by the extreme close shot, enabling the students to see at one time the relationships of the several parts; monitor production can handle such material only with close-ups of parts of the model in sequence.

In using extreme close-up material, the television director must orient himself to think in large-screen terms while using the conventional sized video monitors in the control room.

The Use of Super Impositions. The large screen lends itself to a more effective use of another video presentation variable--the super imposition. The justification for using "supers" is visual reinforcement of significant parts of the oral presentation. The super can came at the exact moment the instructor mentions the point to be reinforced; there is no delay as there would be if he took time to put the material on a blackboard. The super can also be retained on the screen as long as desired and be used over again in the presentation if desired.

Because of the small size of the conventional screen, the lower middle of it has become the standard place to put supers, which are usually no more than three or four words. Even these brief captions are missed entirely by some students because of their smallness on the screen.

Large-screen ITV overcomes this problem and adds several other advantages. More material may be supered at one time, and supers on the large screen do not have to follow the traditional pattern of being placed on the lower middle of the screen.

The placements of a super on one side of the screen, while the instructor is framed on the other side, works particularly well if the super card carries a sentence or phrase instead of just a few words. Using the concept of the split screen, one-half for the instructor and one-half for supered material, lists of items can also be effectively presented. In this case the super card will be vertical, with part of the information covered by one or more black sheets of paper. As the instructor presents the points in the list and discusses them, the floor manager pulls off the sheets of cover paper one by one until every item on the list is supered on the screen. The students can now see the entire list. The instructor can review it and emphasize interrelationships, while the students see him on one side of the screen and the list on the other.

Rear Screen Projections. Large-screen TV instruction can also utilize rear screen projections more effectively than traditional ITV. If visually important information is placed on the rear screen, conventional TV has to cut to a second camera for an extreme close-up of the screen; even then, if there is very much material the screen will appear so "busy" that comprehension will be difficult. Consequently, the rear screen is seldom used for monitor-TV instruction, and primarily for the presentation of 35 mm. slide pictures. For other visual materials, such as graphic illustrations, charts and writing, the preferred method in conventional TV is to use the film chain, which makes the visual fill the entire screen.

Large-screen television, due to its image size, permits use of the full range of visual material by rear screen projection, without recourse to the extreme close-up. Both the visual and the instructor remain in the set, the medium shot of instructor and screen eliminating the need for a camera cut to the screen while projecting an image large enough for easy comprehension of details. With this more practical use of rear screen projection, more slides may be used and graphic material can be presented more rapidly. For example, the instructor does not have to fumble with bulky charts or shuffle papers beneath the overhead camera, and he can refer back to any chart by just having the slide returned to the screen.

The use of rear screen projection to present graphic material is also an advantage to the TV artist, because he can put the material on a much smaller sheet of paper if it is to be photographed for use. In some instances art work can be photographed directly from a book. Finally, the rear screen gives a constant quality and size to the graphic material.

Multi-Person Teaching Formats. Certain TV capabilities for using multiple instructors were pointed out in the discussion of the History 170 study. The large-screen medium is particularly well-adapted to such educational presentations as interview, formal or informal debates, and panel discussions because of the size of its screen image.

In the interview situation, where the regular instructor and a guest are present, a medium two shot projects both persons larger than life size. This is important because the director does not have to continually cut to a head-and-shoulders close-up to establish eye contact and a one-to-one relationship with the student. In fact, cutting to a head-and-shoulders close-up on the large screen causes the image to be too large and out of proportion, distracting rather than making eye contact with the viewer.

In large-screen ITV then, the director can use the medium shot of both persons in the interview, thus keeping the set established, and for variety cut to a medium shot of just one person from the knees up or even more. This shot keeps the image life size or larger. The two shot, establishing medium long shot, and medium shot of one person does not work as well in 24-inch TV because the image is then reduced many times smaller than life size and becomes harder to see.

Group discussions have similar advantages on the large screen. More establishing and more medium shots can be used; the people participating in the presentation can be seen better and more often in relation to each other and the over-all set. Where conventional television has to depend on cutting from a close-up of one person to the same shot of another participant, large-screen ITV can use more cover shots and shots of two or three people together. For panels, discussions and interviews, it becomes easier for the director to use only one camera, should it be necessary.

Dramatic presentations and vignettes can also be used on the large screen because of the image size and the effectiveness of the establishing camera shot. The director does not have to rely on one person close-ups and much cutting. A simple dramatic presentation can thus be done without much camera rehearsal or without fully scripting the production, because the director can stay on one camera for a longer period of time.

Summary.

In summary, large-screen instructional television has certain unique characteristics, primarily due to its large size, which make possible the use of production techniques not typical of conventional television production. These unique production techniques are primarily centered about the use of close-ups, long-shots, superimposures, art work, sets, and performer movement. It is desirable that the planning and production of large-screen television take into consideration those production techniques which are unique to this method of presentation.

CHAPTER VIII

ECONOMIC IMPLICATIONS OF LARGE-SCREEN TV

Of vital importance in analyzing the potential of large-screen television for instruction at the college level, is a study of the costs of supporting or providing instruction through this method as compared to serving the same number of students using the traditional classroom method. This chapter reports a comparison of these two methods as employed at Brigham Young University in the teaching of History 170, the required course in the history of the United States and its institutions. It also attempts some projections based on the History 170 data and sets forth some economic generalizations which may be useful in considering the possible use of large-screen TV in teaching other courses at B.Y.U. and other institutions.

The Problem of Variabilities in Cost of Instructions.

One of the major problems in dealing with the economic dimension of televised instruction, as with conventional instruction is the variability resulting from the innumerable ways which instruction can be conducted. In the case of television, difficulties arise from two separate sets of circumstances. First, instructional television, in its practical application, is a complex, multi-dimensional activity with wide variations in cost depending on how it is utilized. Secondly, the method utilizes a wide range of possible types and qualities of equipment, and costs must necessarily be pegged to the manner in which the equipment is used and the quality desired in the end product.

A number of other variables can enter into and complicate any comparative analysis of a teaching task involving the use of television technologies in instruction. Some of these important variables are (1) the scale of assistance used in supporting instructional programs (art work, photography, grading, etc.), (2) the location used for televising the presentation (studio, lecture hall, classroom, etc.), (3) the use of live vs. videotaped television instruction, (4) the amount of instructional input per program, i.e., the proportion of the instructor's time devoted to television and the number of programs prepared per week or year, (5) the proportion of programs which are remade each semester or year, (6) the number of students viewing the program and the organization of the viewing situation, i.e., the number of times the program needs to be repeated per day per year, (7) the salary scale of television teacher and his supporting staff.[1]

All these variables can materially affect the economic analysis of any use of large-screen televised instruction. It can be said, in fact, that the availability of a high-resolution, high light-output television projector such as the Eidophor used at B.Y.U. introduces a new group of important variables which may be exploited in instruction, but which, at the same time, must be taken into account in any comparative analysis of its use.

Costs of History 170 at B.Y.U.

The teaching of History 170 at B.Y.U. Spring Semester of 1964-1965 using a large-screen television system was planned so that a reasonably well-defined cost-analysis could be made. This was facilitated by dividing costs into four major categories. These are (1) Instructional Costs -- all those normally associated with traditional classroom instruction but also applicable to televised instruction, (2) Production and Recording Costs -- those normally encountered in the various modes of TV production and packaging, (3) Playback and Display Costs -- those involved in TV playback, transmission from point of playback to point of display, and in the display process, and (4) Overhead and Administrative Costs. A set of more-or-less standardized breakdowns were created, where appropriate, under each of these headings as noted in the tables and charts which follow. It should be noted that these cost categories were drawn in such a manner that a comparison might be made between the cost of a course taught by the traditional classroom lecture method and the same course taught via television. In so doing, all costs of the traditional lecture method would be cumulated under categories (1) and (4), whereas the costs of the televised instruction would be arrayed under appropriate heading in all four categories.

The actual comparative costs of conducting History 170 at B.Y.U. Spring Semester of 1964-1965 are actually arrayed in Table IV. To properly interpret the data, the following factors should be considered:

1. Figures represent comparative costs of handling all but some few

---

[1] Meaney, John W. Televised College Courses, New York: The Fund for the Advancement of Teaching, 1962. p. 77-78.

incidental aspects of teaching the course to 1,133 students, the actual number registered in the two large televised sections. In the case of television it reflects the low cost of "first-time" use under conditions enabling "repeat" use at reduced cost.

2. Costs for television reflect a 3/4 time load allocation for the faculty member involved and provides both faculty and graduate assistant personnel for seminar and help sessions in small groups for students in both televised and non-televised sections. The load allocation for faculty in the conventional class analysis is at the conventional 1-to-1 ratio or 1/4 time basis.

3. Costs for the traditional method are based on the existing situation prior to introduction of large-screen television -- classes varying in size from 130 to 200 (with average at 180). The table comparing costs per-credit-hour on a "first-time" and "repeat" basis also utilized these figures and assumes that the first-time cost and enrollment figures would remain uniform in repeat offerings in the case of the traditional class method.

4. The large-screen TV system utilized high-performance, professional broadcast equipment throughout (i.e., image orthicon cameras, regular broadcast TV film chains, oil-film vacuum chamber TV projector, etc.) and that amortization of this high-cost equipment with 10 year write-off is included in all TV related activities.

5. A 15%-of-total-project-cost overhead and administrative figure is included for television compared to the 11% figure utilized in computing costs of conventional instruction by the B.Y.U. History Department.

6. Amortization figures for TV equipment assume 40-hour-per-week, 12 month use for production, which level of use has been reached at B.Y.U. It assumes 35 hour-per-week, 9-month use of auditorium display equipment, which level of use has not yet been reached.

A perhaps more meaningful comparison of costs for the two methods is reflected in Table V. There is reflected in this analysis both a comparison of costs on a "credit-hour" basis (which is the "common denominator" in use at B.Y.U. and most other universities for comparing costs of instruction). and a comparison of "first-time" and "repeat" teaching of the History 170 course using Spring 1964-1965 costs. Costs per-credit-hour with the conventional approach, it will be noted, are pegged at $3.30. The first-time cost of television is about 45% higher than for the conventional method at $5.75 per credit hour. But television drops to $2.48 per credit hour on repeat usage, representing a saving in costs of 19% with each repeat over the cost of repeats with the conventional approach. Figures in Table V cover a 1/3 load allocation for faculty on repeat usage of the television video tapes. The teaching assistant allocation remains the same as for the first-time TV offering. Costs in the production area on repeats reflect the possibility of re-doing 10% of the first-time TV presentations in connection with each repeat usage.

Projected costs for larger groups of students thanthe group of 1,133 involved in History 170 analysis can be ascertained by reading the appropriate curves in Figure I which follows. This figure projects out large-screen TV costs for enrollments up to the 4,000 student level on a cost-per-credit-hour-of-instruction basis. Although the History 170 project utilizes large-screen TV approach with its higher initial cost (compared to conventional handling of the course) followed by lower-than-conventional costs video-tape repeats thereafter, the chart also contains a curve representing costs at various enrollment levels, should a live presentation be made for each large-screen projection of course material be considered. It should be noted that at about the 1,800 enrollment level the cost of live repeats crosses-over the more uniform cost curve for conventional instruction and becomes economical by comparison.

On both large-screen TV curves "x's" have been indicated marking points corresponding to actual and projected enrollments in History 170 for 1964-1965 and the years hence. Cost readings taken at these points indicate potential economics which can be realized through the large-screen approach utilized in the teaching of the American History course at B.Y.U.

Further economies might be achieved, of course, by utilizing less professional and less costly equipment than used for History 170. Consideration might also be given to using clusters of traditional TV receivers in lieu of the large-screen projector for displaying the TV presentations. Rough computations do indicate that regular 24" screen sized receivers(56 sets @ $200 each, 20 students per receiver) could be used in the same auditorium in which the large screen is in use with about a 1.9% saving in per-credit-hour cost. By using small receivers for display, by changing to the newer, less-expensive helical scan tape recorders for recording and playback, and by utilizing vidicon camera equipment in production, a total cost of reduction of about 15% could be realized.

Impact of Intensive Use of Auditoria Space on Instructional Space Costs.

Although costs of classroom space and other physical plant facilities or services have not been a consideration in the foregoing comparison of instructional costs, brief consideration of the potential impact of intensive use of large screen television in a 1,000 seat auditorium such as used for History 170 may be of interest.

At B.Y.U. the cost of regular classroom space on a per-student basis equivalent to that which can be provided in the History 170 auditorium can be computed to about $270,000 (allocating 15 square feet per student @ $18 per square foot). Preliminary studies indicate that there are currently at the University enough large-enrollment introductory classes that with careful planning, the auditorium could eventually achieve twice the daytime utilization of student stations than that presently achieved with varying sized regular classrooms. Difficulty in predicting enrollments for many varied-in-size class sections in variably-sized classrooms seems inevitably to result in a large cumulative total of unused seats each semester. Also smaller classes fluctuate from semester to semester requiring a "safe" estimate on size which often substantially exceeds the realized enrollment. On the other hand, large sections of large-enrollment introductory classes could be so arranged as to occupy the auditorium at a very high percentage of capacity.

If, through addition of large-screen TV classes and live-lecture classes, the auditorium usage should reach 100% day-time hours, it might be possible to double the student station utilization of this space over that achieved with existing classrooms. Near 100% utilization of the existing auditorium space might ultimately enable replacement of $540,000 of existing regular classroom space.

In considering costs of new construction at today's price, the potential saving is more dramatic. It is estimated, for example, that the cost of a new classroom building capable of providing student class hours of instruction equivalent to that which might be achieved through intensive large-screen TV use of the present History 170 auditorium would be around $2 million. Using a 20-year amortization rate for such a new building, the saving in costs of new classroom construction could be as high as $100,000 per year.

Estimating Costs of Large-Screen TV for Other Courses.

As indicated in the introductory paragraphs of this chapter, the difficulties in analyzing the cost of instructional television are considerable because of the vast array of possible variables. Thus, no attempt is made in this treatise to set forth certain formuli, tables of standard costs, or the like, to assist a person in estimating and comparing the relative costs of the various modes of instruction using instructional television. In lieu of such criteria there is represented in Table VI a means of coming-up with reasonably accurate estimates of costs of proposed usages on a case-by-case basis, utilizing the costs of the kind of resources likely to be available to the prospective user in his own circumstances.

It will be noted that the Cost Analysis Form utilizes the same basic four major cost categories and sub-breakdowns formulated for use in analyzing the costs of the History 170 project (Table VI). It is suggested that the user of the form utilize the cost categories under all four major headings in computing costs of televising a certain course, and that only the "Instructional Costs" and "Administrative and Overhead Costs" headings be used in computing the costs of handling the equivalent course content by the traditional classroom method for comparison.

Summary.

It would seem obvious from data gathered in economic study phase of the History 170 project that savings in instructional costs from large-screen TV can be either great or nil depending upon the total course enrollment served, the magnitude of the input costs, the sophistication of the equipment used, the number of videotape or film repeats, etc. Conversely, it is evident that large-screen TV could add appreciably to the cost of instruction unless the right combination of factors and conditions is present.

Finally, it would appear that large-screen projection should be thought of as an important adjunct to the conventional TV receiver as an instructional display device. Having both approaches at its disposal, the University appreciably increases its potential of finding an optimal, "just-right" system approach for the use of instructional television in helping to solve instructional problems and to overcome crippling limitations in the number of students which can be served. And, if used prudently and intelligently, it may contribute substantially to an upgrading of the quality of instruction at the University.

FIGURE I

COSTS OF INSTRUCTION
LARGE-SCREEN TELEVISION COMPARED WITH CONVENTIONAL LECTURE METHOD

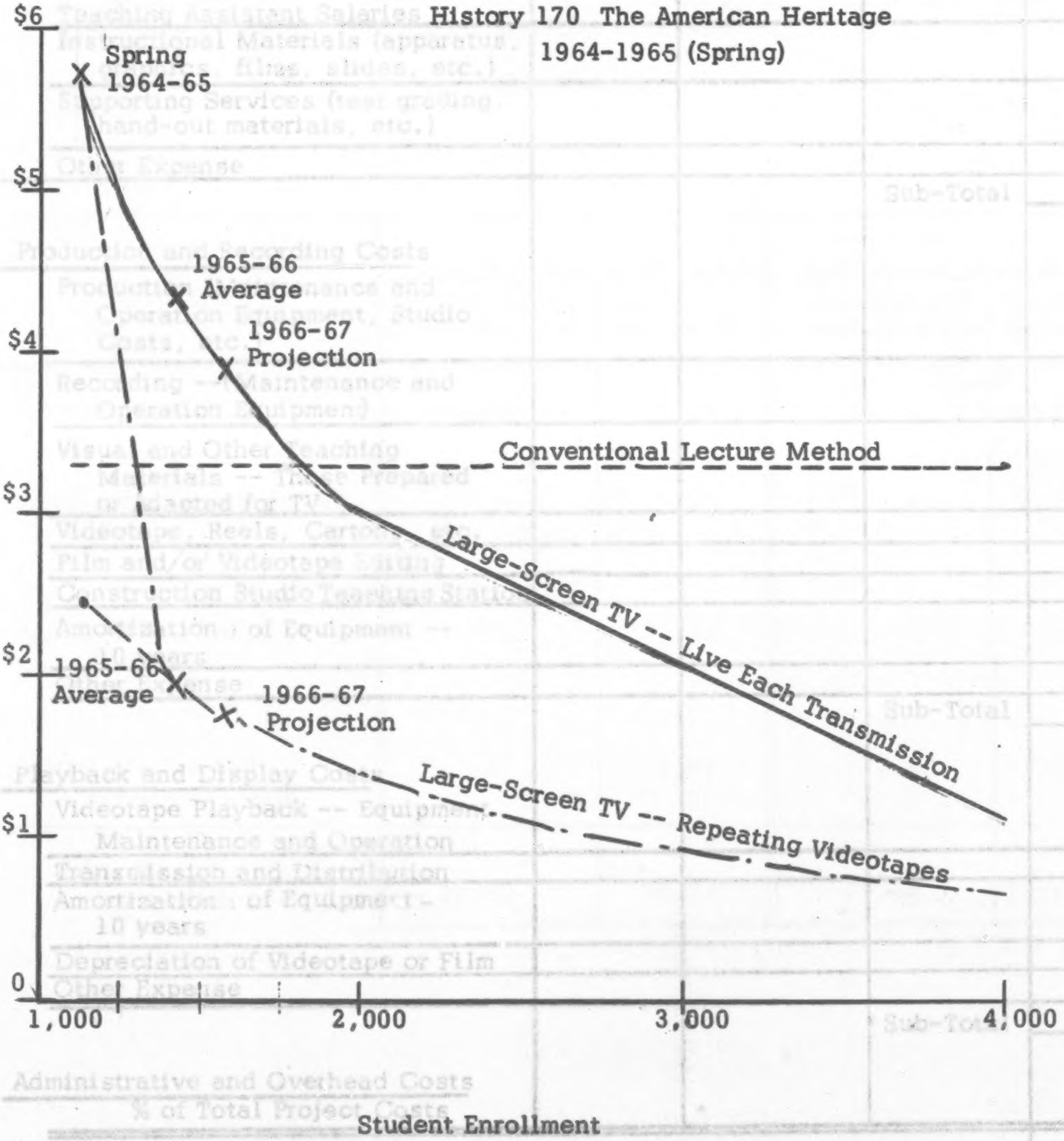


TABLE VI

COST ANALYSIS FORM

Large-Screen Instructional Television
Brigham Young University

Item	Type of Unit	Cost Per Unit	No. of Units	Amount
Instructional Costs				
Faculty Salaries				
Teaching Assistant Salaries				
Instructional Materials (apparatus, graphics, films, slides, etc.)				
Supporting Services (test grading, hand-out materials, etc.)				
Other Expense				
			Sub-Total	
Production and Recording Costs				
Production (Maintenance and Operation Equipment, Studio Costs, etc.)				
Recording --(Maintenance and Operation Equipment)				
Visual and Other Teaching Materials -- Those Prepared or Adapted for TV				
Videotape, Reels, Cartons, etc.				
Film and/or Videotape Editing				
Construction Studio Teaching Station				
Amortization of Equipment -- 10 years				
Other Expense				
			Sub-Total	
Playback and Display Costs				
Videotape Playback -- Equipment Maintenance and Operation				
Transmission and Distribution				
Amortization of Equipment -- 10 years				
Depreciation of Videotape or Film				
Other Expense				
			Sub-Total	
Administrative and Overhead Costs % of Total Project Costs				
			Total	

TABLE V

Initial Cost Per Credit Hour Per Student vs. Repeat Usage

Large-Screen Television Compared to Conventional Instruction

History 170 The American Heritage (3 cr. hours)

Spring Semester 1964-65

(1,133 Students)

Cost Item	First Time Use of TV Tapes		Repeat Use of TV Tapes	
	Conventional Lecture Class	Large-Screen TV	Conventional Lecture Class	Large-Screen TV
Instructional Costs	$3.03	$2.45	$3.03	$1.75
Production and Packaging Costs	0	1.79	0	.09
Playback and Display Costs	0	.44	0	.44
Administrative and Overhead Costs	.27	1.06	.27	.22
TOTALS	$3.30	$5.74	$3.30	$2.48

TABLE IV

COST COMPARISON

Large-Screen Television vs. Conventional Instruction
History 170 The American Heritage
Spring Semester 1964-65
N = 1,133

Costs	Conventional Lecture Method		Large-Screen Televisio Recorded on Videotape	
	Total Cost	Cost/Stud.	Total Cost	Cost/Stud
Instructional Costs	$	$	$	$
Faculty Salaries	6,730	5.95	3,750	3.32
Graduate Assistant Salaries	3,400	3.03	3,400	3.02
Other Teaching Assistant Salaries			950	.84
Assorted Support Materials -- Test Scoring, Handouts, etc.	130	.12	250	.18
TOTALS	$10,260	$ 9.10	$ 8,300	$ 7.36
Production and Recording Costs			$	$
Videotapes			3,900	3.50
Production and Recording			1,584	1.40
Graphic and Other Visual Material			150	.13
Construction Studio Teaching Station			200	.18
Amortization of Equipment			158	.14
TOTALS	0	0	$ 6,052	$ 5.36
Playback and Display Costs			$	$
Videotape Playbacks -- Operation and Maintenance			504	.45
Transmission via Coaxial Cable and Display on Large Screen			468	.43
Amortization of Equipment			508	.45
TOTALS	0	0	$ 1,480	$ 1.33
Overhead and Administrative Costs				
% of Total Cost of Large Screen Course	$ 920	$ .80	$ 2,375	$ 2.10
TOTALS	$ 920	$ .80	$ 2,375	$ 2.10
GRAND TOTALS	$11,180	$ 9.90	$18,207	$ 16.15

TABLE IV

COST COMPARISON

Large-Screen Television vs. Conventional Instruction
History 170 The American Heritage
Spring Semester 1964-65
N = 1,133

Costs	Conventional Lecture Method		Large-Screen Television - Recorded on Videotape	
	Total Cost	Cost/Stud.	Total Cost	Cost/Stud.
Instructional Costs				
Faculty Salaries	$	$	$	$
Graduate Assistant Salaries	6,730	5.95	3,750	3.32
Other Teaching Assistant Salaries	3,400	3.03	3,400	3.02
Assorted Support Materials --			950	.84
Test Scoring, Handouts, etc.	130	.12	200	.18
TOTALS	$ 10,260	$ 9.10	$ 8,330	$ 7.36
Production and Recording Costs			$	$
Videotapes			3,900	3.50
Production and Recording			1,584	1.40
Graphic and Other Visual Materials			150	.13
Construction Studio Teaching Station			200	.18
Amortization of Equipment			158	.14
TOTALS	0	0	$ 6,052	$ 5.36
Playback and Display Costs				
Videotape Playbacks -- Operation and Maintenance			$ 504	$ .45
Transmission via Coaxial Cable and Display on Large Screen			468	.43
Amortization of Equipment			508	.45
TOTALS	0	0	$ 1,480	$ 1.33
Overhead and Administrative Costs				
% of Total Cost of Large Screen Course	$ 920	$ .80	$ 2,375	$ 2.10
TOTALS	$ 920	$ .80	$ 2,375	$ 2.10
GRAND TOTALS	$ 11,180	$ 9.90	$ 18,207	$ 16.15

CHAPTER IX

SUMMARY AND CONCLUSIONS

This study has been structured about the use of large-screen television, at Brigham Young University and has covered a wide variety of contact with large-screen instructional TV. The study has provided verification of some previous ITV studies. It has also developed some new information which may be useful to those institutions which may consider large-screen TV as a solution to some of the problems of adequately serving the large number of students pressing for admittance to the college campuses. A brief summary of some of the findings of the study and reference to their implications in higher education may serve as guidelines to those institutions giving consideration to the possibility of installing large-screen instructional TV. It may also provide an avenue of exploration for those institutions studying their own internal problems related to increased numbers of students, limited physical facilities, limited faculty, and the advancement of the quality of teaching at the college level.

Large-Screen TV Facilities.

The Brigham Young University large-screen TV study has shown that it is comparatively easy to adapt an existing auditorium to use as a large-screen classroom. Moreover, such a classroom may provide the physical capability of many thousands of student hours of instruction per day. In short, such a facility may provide the instructional capability of a new classroom building at only a fraction of the construction and maintenance cost of such a building. The TV production system used in this study was the Eidophor control layer system, and many of the findings of this study are not applicable to any other large-screen TV projection system.

The Instructional Effectiveness of Large-Screen TV.

The study has supported the vast array of TV studies showing no significant difference in measured learning or information gain between face-to-face instruction and instruction mediated by television. This study also supports the previous Pennsylvania State University study showing no significant difference in measured learning or information gain between conventional ITV and large-screen ITV.

It can therefore be concluded that large-screen television has the capability of providing a system of effective instruction for some college level courses.

Student Location and Performance.

A carefully controlled study of the performance of students located in various locations within the auditorium during the presentation of History 170 shows no significant difference in academic achievement that could be attributed to student location. In the conventional auditorium where the location of students is maintained within the tolerances described in the section of the study devoted to viewing angle and distance, student achievement was not found to be a function of physical location in reference to the viewing screen. It was noted that some seating locations in the auditorium seemed to be preferred over others; nevertheless, this was not found to affect learning.

Student Attitudes Toward Large-Screen ITV.

The question of student attitudes is always important in a new educational program. But it is recognized that attitudes are very difficult to identify and more difficult to measure and evaluate. Nevertheless, an awareness of student attitudes is useful in evaluating a new instructional program.

A questionnaire was administered to all participants in the History 170 study in an effort to obtain information on student attitudes. A detailed explanation of this phase of the study is given in Chapter V.

Some of the pertinent findings of the student attitude section of the study follow. In general, students who have had no previous ITV experience approach the instructional television environment with greater anxiety. Those students in the control group not exposed to TV instruction, tend to be more negative to ITV than those taking the course by TV.

It is thus recommended that the incorporation of ITV into a university curriculum include extensive student orientation. This is even more important in the large-screen situation because of the theater-like atmosphere.

Students in the TV sections in general responded favorably to the large-screen TV instructional situation. There is, however, some indication that the large class and the theater-type atmosphere tend to accentuate to some degree problems in motivation and deportment among some students. This tendency is probably a function of increased student anonymity in the instructional situation.

In general, the student response to large-screen TV was favorable and supports further use and expansion of the large-screen TV method of mediating instruction.

Faculty Attitudes Toward ITV.

Part VI of the study deals with faculty attitudes toward ITV. It was considered important to be aware of the degree of acceptance or hostility among faculty members and to know from what quarters the ITV program could expect the greatest resistance or support.

This study supports findings of previous studies that, in general, college faculty attitudes are predominantly negative in respect to instructional television. In addition, this study attempted to determine if there was a relationship between faculty attitudes toward ITV and such variables as age, sex, faculty rank, highest academic degree, and prior experience with ITV. The findings indicate no relationship between faculty age and ITV attitudes. Male faculty members were found to be slightly more favorable than female faculty members. It was found that the higher the faculty rank the more favorable the attitude toward ITV and that those with the highest academic degrees were more favorable toward ITV. For the total sample, faculty members with prior ITV experience were more favorable than those with no previous ITV experience. It should be noted that even though there was found to be some correlation between faculty attitudes and the variables of age, sex, faculty rank, highest degree earned, and prior experience with ITV, in no case was this correlation found to be statistically significant. The date does, however, suggest the possibility that the respondents most favorable to ITV are in general older, have higher faculty rank, and have prior experience with ITV. It is interesting to note that this is somewhat contrary to popular opinion concerning faculty attitudes.

Large-Screen TV Production Techniques.

The study has shown that there are some characteristics of large-screen TV that are different from conventional ITV and should receive special consideration in preparing and presenting courses via large-screen TV.

Large-screen TV is designed for the auditorium-size of room, and numbers of students do not normally lend themselves well to student-teacher interaction. Attempts by some institutions to provide elaborate inter-communication systems between TV teacher and students appear to have limited value in the live presentation and no value at all when the lecture is pre-recorded. Care in selecting an instructor for large-screen TV who has had sufficient teaching experience (not necessarily television teaching) to permit him to anticipate the questions and responses of students is desirable. The TV lecture should then be structured to include answers to these anticipated questions and responses. Also, the large-screen TV instructional situation should theoretically provide more office hours for the instructors to spend in private consultation with individual class members. Pre-recording of the lectures provides the teacher with the opportunity to visit the classroom and personally evaluate the quality of instruction.

Large-screen TV provides the capability of presenting a larger-than-life-sized-image in the instructor, objects, displays, and demonstrations. This reduces the need for much of the traditional camera switching of conventional ITV needed to provide close-ups and the wider establishing shots. The large-screen TV teacher is thereby permitted to remain in the scene with his teaching materials, maintaining a closer personal relationship to his teaching environment and reducing the need for the head and shoulders close-up shot used in conventional screen TV. This reduces the possibility of a psychological break between the lecturer and his demonstrations.

Conventional ITV tends to use plain, simple backgrounds for sets. Large-screen TV permits the use of much bigger, busier sets, because the reduction in the need of close-ups allows the teacher to appear in his more natural setting of laboratory, classroom, etc.

When showing fine detail in conventional ITV, it is often necessary to show only small parts of an object to provide the desired magnification. However, large-screen TV has the capability of enlarging much larger objects, thereby reducing the need to fragment objects for enlargement.

One of the most useful techniques in ITV is the use of superimposures for added emphasis to oral and visual information. For example, the name of an object can be superimposed over that object while it is being discussed.

The added screen size of large-screen TV provides great possibility for the successful utilization of this technique without detracting from the visual material being shown. Superimposures may appear on the large screen in many positions without the crowding that would normally occur on the conventional TV monitor. More material (i.e., a complete phrase, sentence, paragraph, or simple outline) can be supered, whereas conventional ITV is limited usually to only one or two words.

Large-screen TV has the capability of greatly expanding the utility of rear-screen projections for ITV use. For example, the TV teacher becomes so small he is almost lost when appearing in the frame with a rear-screen projection on the conventional monitor. However, with large-screen TV, rear-screen projection becomes a very useful tool for quickly adding all manner of material to the large-screen TV set without greatly reducing the size of the instructor and still maintaining desirable instructor and background relationships on the TV screen.

It is often useful to present two or more people on the TV screen at one time. This may take the form of an interview, discussion, debate, or panel. On the conventional TV monitor the image size is too small to show adequately more than one person on the screen at the same time. Thus, camera cuts from a close-up or medium close-up of one person to a close-up or medium shot of another person become a predominant format. With large-screen TV, several people may appear in the same scene without the need for constant camera switching and resulting breaks in interaction between participants. This is particularly helpful when using some forms of team teaching.

There are other useful large-screen TV production techniques which grow out of the use of the medium. Continued research done beyond this study will provide other useful large-screen production techniques.

Teaching Load.

Providing the instructor of a large-screen television course (or conventional screen course, for that matter) with adequate time to prepare and administer the course requires a substantial modification of traditional concepts of the teaching load. As a result of the History 170 experience, it is suggested that a two or three-semester-hour large-screen course be considered as a half-load in the semester before the first offering, a full-load in the first semester it is offered, and a half-load thereafter. Unless the sponsoring department and institution are prepared to make this time available, conversion of a large lecture class to television is likely to result in little more than an old-fashioned lecture with a few pictures, charts, maps, and models thrown in when handy. The result may be a saving in staff time and/or institutional funds, but it will not realize the potential of the television medium.

Teaching Assistants.

If graduate teaching assistants are used to conduct discussion sections and to help administer the lecture sections of a large-screen course, several factors should be kept in mind. The assistants have a responsibility by their appearance and deportment to contribute to the students' awareness that they are in a college class, not a motion picture theater. The assistants should be briefed on the basic technical aspects and instructional capabilities of ITV, so that they can field student questions and reassure those with misgivings. As key elements in the feedback system, they should have regular conferences with the instructor, at which time possibilities for improving all aspects of the course should be freely discussed. The TV producer should also occasionally meet with the assistants.

Some Criteria for Selecting Courses for Large-Screen ITV Presentation.

Many factors in selecting a course apply not only to large-screen TV, but also to ITV in general. Some factors which should be used as a basis for judgement of the appropriateness of instructional television are: (1) the nature of the subject; (2) the data on comparative effectiveness; (3) the size of the enrollment; (4) the full potentialities of the video and audio channels of the TV system; and (5) the reactions and characteristics of both instructors and students.

The general format developed for lecture sections of 100 or more students may be readily applied to large-screen sections up to or over 1,000 students. Auditorium capacity and screen visibility will set the limit.

On the basis of the History 170 experience and the foregoing observations, it appears that courses suitable for large-screen ITV presentation should fit into one or more of the following categories:

1. A course which is presently being conducted in a large lecture section, with or without supporting small discussion groups. A course

which is conducted in multiple sections every semester is particularly suitable.

2. A lecture course for which a variety of audio-visual instructional material is available and appropriate, whether or not such material is presently being used effectively.

3. A lecture course in which visual demonstration plays an essential instructional role.

4. A multiple-section lecture course which presents staffing problems.

5. A lecture course which is presently using guest lecturers or other team-teaching arrangements, or which would be strengthened by such use.

6. A lecture course which is presently being taught by an instructor with adequate ITV capability, or for which such an instructor is available.

7. A lecture course which can be adapted to programmed and/or paced instruction.

If a course has any of the qualities of the categories in the following list, then it is not adaptable to large-screen instruction:

1. Courses that require the presentation of stimulus materials in color and where color is crucial to learning, understanding and appreciation. This is assuming that black and white cameras are being used and not color cameras.

2. Courses dependent on a degree of high optical resolution of detail which exceeds the resolving powers of television.

3. Courses which depend heavily on student-teacher interaction.

4. Courses which are primarily presented orally and a minimum of visual material ever being used.

5. Courses which depend on immediate overt responses.

6. Courses whose pace is determined by student feedback.

7. Courses which cannot be taught completely by television with or without separate discussion groups.

While the study did not consider minimum or maximum limits on class size, it would appear that any class which is presently being conducted in one or more lecture sections so large that useful student-teacher interchange on an individual basis is precluded or inhibited, and which satisfies point six, may be appropriate for the large-screen medium. The auditorium sections of History 170 taught during the two semesters of 1964-1965 ranged from 385 to 803 students, with no differences in student accomplishments or attitudes which could be related to class size.

It follows that courses which require individual recitations, class responses, student utilization of tools or equipment, student-teacher or inter-student discussion, or other participation by the student than in a recipient role, are unsuitable for large-screen presentation. For courses which combine formal lectures with discussions or practice work, monitor-TV presentation to smaller groups may be a means for achieving some of the advantages of television lectures while permitting convenient direction of the related student activities by teaching assistants. Large-screen TV has this capability only if the course includes auditorium lectures and compulsory small discussion group meetings, and even then the time gap makes direct and detailed follow-up of the lectures difficult.

Economic Consideration of Large-Screen TV.

This study has shown that the savings in instructional costs can be either large or small depending upon the total course enrollment served, the magnitude of the input costs, the sophistication of the equipment used, the number of videotape or film repeats, etc. It should be noted that great care should be exercised in setting up the large-screen TV system in order that an optimal systems approach will provide instructional savings in finances and human resources while upgrading the quality of instruction.

General Conclusions.

The findings of the study in general support large-screen television instruction as a method of providing relief to the current problems of inadequate calssroom space and teaching personnel at institutions of higher learning. The study further indicates that the level of success which a large-screen instructional TV system may enjoy will be dependent upon the nature of the physical facilities, faculty and student orientation, proper production techniques, wise selection of courses, and an awareness of the economic limitations of the system.

APPENDIX A

TABLE I

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS I CHAPTER III

TEST 1

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	124	0.219E 04	0.4064E 05	17.694	3.843	1.960	$P > .05$
41	452	0.763E 04	0.1365E 06	16.887	4.115		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

APPENDIX

TEST 2

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	114	0.212E 04	0.4154E 05	18.614	4.349	1.221	$P > .05$
41	444	0.801E 04	0.1534E 06	18.043	4.484		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

APPENDIX A

TABLE I

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS I CHAPTER III

TEST 1

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	124	0.219E 04	0.4064E 05	17.694	3.843	1.960	P> .05
41	452	0.763E 04	0.1365E 06	16.887	4.115		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 2

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	114	0.212E 04	0.4164E 05	18.614	4.349	1.221	P> .05
41	444	0.801E 04	0.1534E 06	18.043	4.484		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE 1

CONTINUED

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS I CHAPTER III

TEST 3

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	112	0.193E 04	0.3570E 05	17.250	4.624	0.855	P>.05
41	430	0.725E 04	0.1303E 06	16.849	4.369		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 4

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	114	0.218E 04	0.4395E 05	19.008	4.610	1.229	P>.05
41	426	0.788E 04	0.1543E 06	19.507	4.448		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE 1

CONTINUED

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS I CHAPTER III

TEST 5

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	108	0.183E 05	0.3337E 05	16.898	4.866	2.544	$P < .05$
41	435	0.678E 06	0.1155E 06	15.595	4.737		

The results of the "t" test indicate a significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 6

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	113	0.187E 04	0.3303E 05	16.549	4.316	1.455	$P > .05$
41	420	0.660E 06	0.1137E 06	15.888	4.276		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE I
CONTINUED

RESULTS OF THE "t" TEST APPLIED TO THE DATA THE TESTING OF HYPOTHESIS I CHAPTER III

TEST 7

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	52	0.612E 03	0.7854E 04	11.769	3.573	1.954	$P > .05$
41	429	0.465E 04	0.5479E 05	10.837	3.209		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 8

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
40	122	0.583E 04	0.2998E 06	47.820	13.113	1.912	$P > .05$
41	474	0.216E 05	0.1045E 07	45.498	11.645		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE II

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS II CHAPTER III

TEST 1

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	46	0.822E 03	0.1553E 05	17.870	4.324	1.321	$P > .05$
41	356	0.666E 04	0.1301E 06	18.699	3.969		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 2

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	35	0.571E 03	0.1047E 05	16.314	5.835	1.667	$P > .05$
41	359	0.534E 04	0.8764E 05	14.861	4.830		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE II

CONTINUED

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS II CHAPTER III

TEST 3

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	44	0.798E 03	0.1543E 05	18.136	4.713	1.798	$P > .05$
41	354	0.598E 04	0.1075E 06	16.904	4.234		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 4

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	44	0.820E 03	0.1631E 05	18.636	4.885	2.300	$P < .05$
41	343	0.584E 04	0.1058E 06	17.041	4.257		

The results of the "t" test indicate a significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE II

CONTINUED

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS II CHAPTER III

TEST 5

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	41	0.670E 03	0.1196E 05	16.341	5.018	2.836	$P < .05$
41	337	0.492E 04	0.7816E 05	14.605	4.320		

The results of the "t" test indicate a significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 6

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	43	0.676E 03	0.1173E 05	15.721	5.115	1.224	$P > .05$
41	400	0.593E 04	0.5930E 05	14.835	4.442		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TABLE II

CONTINUED

RESULTS OF THE "t" TEST APPLIED TO THE DATA FOR THE TESTING OF HYPOTHESIS II CHAPTER III

TEST 7

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	42	0.476E 03	0.5976E 04	11.333	3.765	0.455	P>.05
41	336	0.373E 04	0.4447E 05	11.101	3.026		

The results of the "t" test indicate no significant difference in academic achievement between sections 40 and 41 at the .05 level of significance.

TEST 8

Section	N	Sum X	Sum XX	Mean	S.D.	F	P
50	48	0.269E 04	0.2112E 06	56.104	35.772	0.679	P>.05
41	326	0.17 E 05	0.1173E 07	53.043	28.058		

The results of the "t" test indicate no significant difference in academic achievement between section 40 and 41 at the .05 level of significance.

APPENDIX B

Course Evaluation by Students in History 170

These questions were asked at the last regular meeting of the sections of History 170. The figures given are percentages; they do not always total 100% because the figures have been rounded off and because not every student responded to every question. The results indicate the responses of control and experimental groups: section 40, consisting of 127 students taught by the conventional lecture method; section 41, consisting of 474 students receiving instruction via large-screen TV; section 50, consisting of 47 students receiving instruction via standard 24-inch TV monitors; and section 51, consisting of 385 students receiving instruction via large-screen TV. An asterisk (*) is placed before sections which are substantially different.

1. What is your class?	40	41	50	51
(1) Freshman	68	66	64	66
(2) Sophomore	18	21	21	21
(3) Junior	8	8	12	10
(4) Senior	5	4	2	2

2. If your course grade were based only on the quizzes which you have taken so far, what do you estimate that it would be?				
(1) A	11	9	14	10
(2) B	26	24	24	26
(3) C	47	53	45	49
(4) D	14	13	14	13
(5) E	1	2	2	1

*3. Approximately how many discussion sections have you attended?				
(1) Every week	11	17	17	16
(2) 9-12	13	17	24	19
(3) 5-8	25	20	12	20
(4) 1-4	27	23	24	22
(5) None	23	23	24	22

4. Approximately what is your cumulative grade-point average up to the beginning of this semester?				
(1) Above 3.0	18	17	26	19
(2) Between 2.5 and 3.0	33	30	26	31
(3) Between 2.0 and 2.5	28	30	26	31
(4) Between 1.5 and 2.0	17	13	12	17
(5) Below 1.5	3	3	5	3

*5. As a textbook for this course, how do you rate Fielding-Campbell, The United States: An Interpretive History?				
(1) Excellent	9	9	14	12
(2) Good	43	44	48	44
(3) Fair	29	28	24	26
(4) Poor	17	15	10	15
(5) No Opinion	2	4	5	3

*6. As a textbook for this course, how do you rate Miller, Readings in American Values?

	40	41	50	51
(1) Excellent	14	12	31	13
(2) Good	38	40	29	37
(3) Fair	25	31	29	37
(4) Poor	13	10	5	13
(5) No opinion	10	6	7	8

7. As a textbook for this course, how do you rate Griffith, The American System of Government?

(1) Excellent	8	5	10	7
(2) Good	25	31	31	28
(3) Fair	38	36	36	32
(4) Poor	18	17	12	23
(5) No opinion	11	11	12	10

*8. In comparison with other lower division college courses which you have taken, how do you rate the tests in this course?

(1) Very difficult	17	24	26	31
(2) Moderately difficult	60	51	48	44
(3) About average difficulty	19	21	26	21
(4) Moderately easy	4	4	0	3
(5) Very easy	0	0	0	0

*9. How do you rate the tests in this course for fairness?

(1) Very fair	29	21	26	16
(2) Generally fair but with a few unfair questions	55	62	67	62
(3) Quite a few unfair questions	12	11	19	7
(4) Very unfair	1	2	0	2
(5) No opinion	2	2	0	1

*10. What is your evaluation of the discussion sections as aids in the course?

(1) Very helpful	11	21	17	23
(2) Helpful	45	40	57	36
(3) Of little value	18	14	2	18
(4) I have attended none	26	23	24	23

*11. What is your opinion of making attendance at discussion sections compulsory for all students?

(1) It is a good idea	5	10	14	11
(2) Compulsory attendance only for those making C or below on quizzes would be better	23	16	12	14
(3) Compulsory attendance only for those making D or below on quizzes would be better	19	9	12	12
(4) Voluntary attendance for everyone is better	48	60	60	60
(5) I have no opinion	4	4	0	3

*12. How do you rate your teaching assistant?

	40	41	50	51
(1) Very good	27	31	43	33
(2) Good	33	29	26	26
(3) Fair	11	9	7	7
(4) Poor	1	2	0	1
(5) I have had insufficient contact to make a judgement.	26	28	24	31

*13. What is your evaluation of the class essay as an educational activity?

(1) Very worthwhile	33	30	31	36
(2) Fairly worthwhile	50	48	50	46
(3) Of little value	11	16	19	11
(4) I haven't written the essay	4	4	0	5

*14. Using your own experience in other large (100 students or more) classes for comparison, how does the use of TV affect the learning experience?

(1) Learning is more difficult when TV is the medium of instruction	54	36	29	35
(2) Learning is equally difficult (or easy) in the TV class or conventional lecture class	18	36	33	39
(3) Learning is less difficult in the TV class	4	16	29	13
(4) I have no basis for comparison	21	10	7	10

*15. How do you rate the technical quality of the television production in this course?

(1) Very good	15	17	21	18
(2) Good	50	52	59	47
(3) Fair	18	26	19	27
(4) Poor	1	3	5	2
(5) No opinion	16	1	0	1

*16. How much does the use of visuals (maps, pictures, films, slides, taped sounds, etc.) contribute to this course?

(1) Very much	27	66	67	64
(2) Some	51	29	31	31
(3) Very little	11	4	0	2
(4) None	5	0	0	1

*17. How do you rate the over-all quality of the content of the visuals used?

(1) Excellent	11	29	24	28
(2) Good	53	55	60	60
(3) Fair	16	13	10	9
(4) Poor	1	1	0	1
(5) No opinion	18	1	5	0

18. How do you rate the contribution of the noon films to the course?

	40	41	50	51
(1) Very worthwhile	8	10	14	15
(2) Fairly worthwhile	14	11	19	15
(3) Of little or no value	2	3	2	3
(4) I have attended too few to make a judgement.	74	73	60	63

19. How do you rate the contribution of the Unit Study Helps to the course?

(1) Very helpful	25	30	29	27
(2) Fairly helpful	38	38	33	35
(3) Of little or no value	5	7	7	12
(4) I have not used them	29	23	29	23

*20. How do you classify the lectures in terms of political bias?

(1) Very conservative	6	4	7	5
(2) Moderately conservative	49	41	38	42
(3) Middle-of-the-road	31	38	24	32
(4) Moderately liberal	8	13	24	12
(5) Very liberal	2	1	3	1

21. How does this course compare in difficulty with other lower division courses that you have taken?

(1) More difficult	48	44	45	49
(2) About average	46	48	48	42
(3) Less difficult	4	4	2	5

22. How much has this course contributed to your knowledge of American history and government?

(1) Very much	44	38	57	40
(2) Some	44	47	29	46
(3) Very little	10	9	8	7
(4) None	1	1	2	2

23. The objective of the History 170 requirement is to strengthen the understanding of the American constitutional system and the sense of civic responsibility. To what extent has this course realized this objective in your case?

(1) Very much	29	23	31	28
(2) Some	48	57	48	54
(3) Very little	17	13	10	13
(4) None	2	2	5	2

*24. In comparison with other lecture classes which you have taken, how do you rate the lectures in this class?

*25. In comparison with other lower division college classes which you have taken, how do you rate this class in over-all quality?

(1) Above average	33	29	45	27
(2) About average	53	55	41	57
(3) Below average	8	11	6	10

*26. If a good friend asked your advice on whether to take the TV section of History 170 next semester or to take a regular 200-student lecture section under a comparable instructor, what would you reply?

	40	41	50	51
(1) Take the regular lecture section of History 170	67	34	19	36
(2) Take the TV section	11	43	55	37
(3) You have no preference one way or the other	12	10	12	14
(4) You have had no experience with another lecture class upon which to base a comparison	6	8	10	7

*27. Insofar as you have been able to observe, have there been violations of the Honor Code by students in this class?

(1) Very many	1	2	3	0
(2) Some	19	16	10	13
(3) Very few	21	23	12	24
(4) None	53	52	71	54

*28. Insofar as you have been able to observe it over the semester, how would you rate the student deportment in this class in comparison with other large (100 students or more) classes which you have attended?

(1) This class is much better	22	5	5	4
(2) This class is a little better	31	16	17	13
(3) This class is about the same as others	38	48	60	49
(4) This class is a little worse	4	18	10	21
(5) This class is much worse	0	5	0	5

APPENDIX C

FACULTY OPINION SURVEY

- - - - - - - - - - - - - - -

LARGE-SCREEN INSTRUCTIONAL TELEVISION

(Brigham Young University)

INTRODUCTION

In the following survey you will be asked to respond to a number of statements related to instructional television. We would like to have your honest opinion on each of the questions that we are including in the survey. Please do not put down what you think you ought to feel, but only how you actually feel about each question.

Instructional television as referred to in this survey is the formal presentation of complete courses via television. An example of this is presently being used in two sections of History 170 at Brigham Young University.

For each of the following statements place a check mark under the response category that most closely approximates your opinion of the statement. Each statement should be treated independently from all others and responded to in terms of your actual feelings. All questions refer to instructional television at the college level.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. The presence of the teacher in the classroom overrides the advantages of instructional television.	( )	( )	( )	( )	( )
2. In my opinion, instructional television would result in the loss of teaching effectiveness.	( )	( )	( )	( )	( )
3. In view of the monetary limitations of providing more teachers and classrooms, instructional television could be the best solution for solving the problems of shortages in both classrooms and teaching personnel.	( )	( )	( )	( )	( )

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
15. Instructional television is usually more entertaining than instructional.	( )	( )	( )	( )	( )
16. Generally speaking, information gain would be greater in instructional television courses than in conventional courses.	( )	( )	( )	( )	( )
17. In my opinion, students would view the television instructor as having more status at the University than the conventional classroom teacher.	( )	( )	( )	( )	( )
18. Instructional television provides little that could not be provided through films and other visual aids.	( )	( )	( )	( )	( )
19. If given sufficient time and personnel, I would like to supervise the production of an instructional television course in my department.	( )	( )	( )	( )	( )
20. In my opinion, I would have less difficulty in covering the required course material as a teacher using instructional television.	( )	( )	( )	( )	( )

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
4. Instructional television would tend to increase the effective utilization of other audio-visual materials.	( )	( )	( )	( )	( )
5. I do not understand all the implications that instructional television has for me.	( )	( )	( )	( )	( )
6. Instructional television could be easily adapted to some of the courses I teach.	( )	( )	( )	( )	( )
7. Instructional television would result in a loss of personal satisfaction that is derived from teaching.	( )	( )	( )	( )	( )
8. I would be willing to teach an instructional television course.	( )	( )	( )	( )	( )
9. In my opinion, I could be a better instructor on television than in the conventional lecture class.	( )	( )	( )	( )	( )
10. In my opinion, it would be difficult to effectively teach controversial issues with instructional television.	( )	( )	( )	( )	( )
11. In my opinion, the attitudes of students are generally unfavorable toward the use of instructional television.	( )	( )	( )	( )	( )
12. Students see too much T.V. already.	( )	( )	( )	( )	( )
13. In my opinion, I would have a greater discipline problem with instructional television than with the conventional lecture class.	( )	( )	( )	( )	( )
14. Teaching skills of the teacher are generally improved with the use of instructional television.	( )	( )	( )	( )	( )

DEPARTMENT: ____________________

FACULTY RANK: (1) Professor ☐ (4) Instructor ☐
(2) Associate Professor ☐ (5) Special Instructor ☐
(3) Assistant Professor ☐ (6) Other __________

Highest Degree Earned__________ Major Field__________ Date Awarded__________

University where last degree was earned____________________

Number of years of college teaching experience: B.Y.U.__________ Other__________

Sex: Male ☐ Female ☐ Age__________

Prior experience with instructional television____________________

Explain Briefly:____________________

Please check the type of teaching method most preferred:

(1) Seminar ☐ (2) Lecture ☐ (3) Laboratory ☐

Did this questionnaire completely tap your opinions about instructional television?

YES__________

NO__________ What other opinions do you have?____________________

Brigham Young University

USOE RESEARCH PROJECT # OE-7-54-0010-265